THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XXII. No. 530.] LONDON, JANUARY 28, 1873. [25TH YEAR.] DOUBLE No. Price 1s.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 24-candle gas; 13¼ cwt. coke per ton of coal.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

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GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GEORGE GLOVER & CO.,
Patentees of the Standard Gasometers for the Government, and of the
IMPROVED DRY GAS-METERS.

These Meters are warranted to measure correctly and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured.
To meet the increasing demand, G. GLOVER AND CO. have just entered on possession of extensive premises adjoining their present Works in Ranelagh Road, and they are now prepared to execute promptly, orders to any extent. They keep in stock all sizes of Meters up to 200 lights. In cases of haste, on the receipt of a telegram early on one day, their Meters can be delivered next day in any part of England, and in the large towns in Scotland.
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236, GEORGE STREET, GLASGOW;
OR
15, MARKET STREET, MANCHESTER.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they have also been awarded in the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

JOHN RUSSELL AND CO.,
THE OLD TUBE-WORKS, WEDNESBURY;
AND
THE ALMA WORKS, WALSALL.
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16, SOHO SQUARE,
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J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
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WET AND DRY GAS-METER
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STREET-LAMP
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All materials found for the alteration of Public Lamps for lighting with the Rod. Regulators with Lava Burners.

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NEAR NEWCASTLE-ON-TYNE.
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HAVE OBTAINED THE
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FOR

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PARIS, 1867.

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AT THE
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FOR GAS, STEAM, AND WATER;

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FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

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For Gas, Steam, Water, &c.

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LAP-WELDED IRON & HOMOGENEOUS METAL TUBES

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THE UNVARYING WATER-LINE GAS-METERS,

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STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges,

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AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

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PARIS, 1867.

CLASSES 24 and 53.

WILLIAM SUGG,

GAS ENGINEER.

LONDON, 1862.

CLASSES 13 and 31.

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IMPROVED LOWE'S JET PHOTOMETERS.

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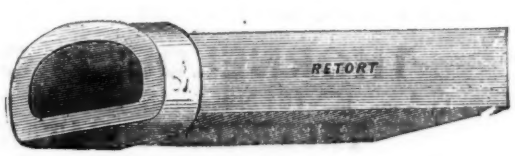
KING BROTHERS,

STOURBRIDGE FIRE-BRICK AND RETORT WORKS.



KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them FREE FROM CRACKS AND CORRECT IN FORM. By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

Retort Ovens, Fire-Bricks, Guards, Saddles, Rabbitted Burs, Flues, and Quarries, are all Manufactured of the same quality of Clay.

Every Retort and Brick is branded "King Brothers, Stourbridge."

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CALLEY'S GENUINE "TORBAY" PAINT

AND

THE ANTI-GALVANIC PAINT.

THESE PAINTS ARE SPECIALLY PREPARED, and are most valuable for protecting and arresting rust on all Ironwork, AND WILL COVER TAR EFFECTUALLY; they adhere strongly, acquire great solidity, do not crack, flake off, or blister by heat, and they resist the effects of SULPHUROUS AND GASEOUS EXHALATIONS.

They are used extensively at a large number of GAS-WORKS, on Gasholders, Purifiers, and all classes of Ironwork; also by Government, Railway Companies, &c.

Our CIRCULAR will be forwarded on application. SAMPLE CAN, for trial, sent free of charge.

Works: Brixham, Torbay, Devon,

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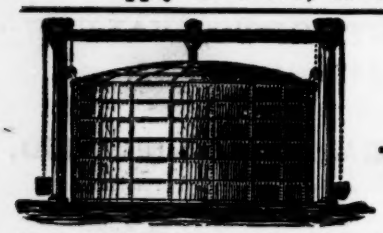
Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

The F. I. Co. have the exclusive right to make and sell Fraser's Patent "Ribbed" Gas-Retorts in Fire-Clay.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

Apply as above, or to the London Offices, 15, NEW BROAD STREET, E.C.



IMPROVED GAS APPARATUS,

FOR CITIES, TOWNS, VILLAGES, &c.,

INVENTED AND MANUFACTURED BY

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WHITESTONE IRON-WORKS, HUDDERSFIELD.

SOLE MANUFACTURERS of B. W. THURSTON'S IMPROVED SCRUBBER, CONDENSER, and WASHER, in use in many of the principal Gas-Works on the Continent.

PATENTEES of the IMPROVED COMBINED PURIFYING APPARATUS, so eminently adapted for Exportation.

ESTIMATES, PLANS, and SPECIFICATIONS PREPARED for BUILDINGS and APPARATUS.

Prospectus, Price Lists, &c., on application.

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REFERENCES TO UPWARDS OF 300 GAS-WORKS.

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(ESTABLISHED IN 1765,)

BOILER AND GASHOLDER WORKS,

Westbromwich, near Birmingham.

MANUFACTURER OF TELESCOPE AND SINGLE GASHOLDERS,

WROUGHT & CAST IRON TANKS

FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS,

And all kinds of GAS APPARATUS.

Wrought-Iron Roofs, Bridges, and Girders; Steam, Hot Water, and Range Boilers; Tanks, Cisterns, &c.,

And all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, and ESTIMATES FURNISHED.

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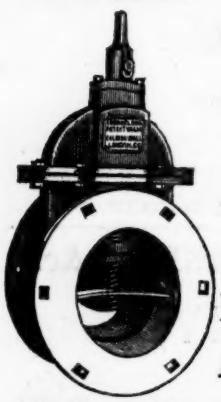

PATENT VALVE.

THORNELOE & COCHRAN,

GAS ENGINEERS AND CONTRACTORS.

THORNELOE'S PATENT VALVE

For GAS and WATER, from 3 to 24 inches,

SUPPLIED FROM STOCK.

They are now in use at the following Gas-Works in London:—

PHŒNIX AND SOUTH METROPOLITAN;

Also at Aylesbury, Aldershot, Colchester, Farnham, Guildford, Leicester, Ilford, Middlesboro' Patent Gas Company, Reading, &c.

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PATENT REGULATING DIP-PIPE.

Prospectus, with Price Lists and Particulars, on Application.

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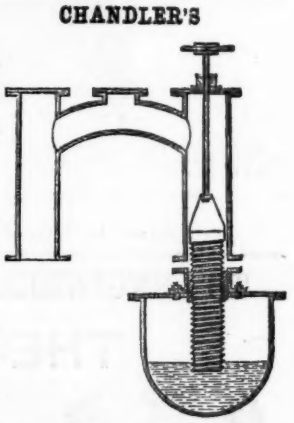

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TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

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WOOD GRIDS

FOR PURIFIERS AND SCRUBBERS,

AND

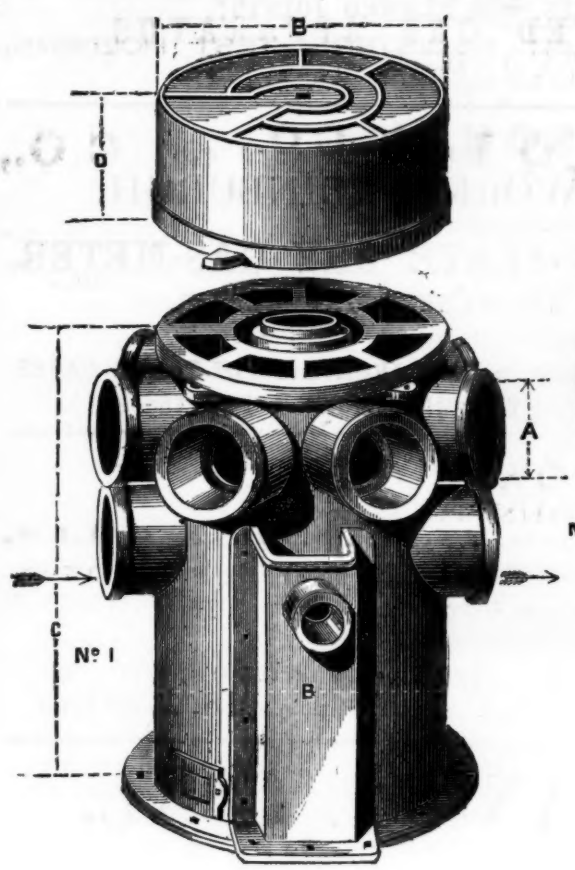
CONTRACTOR FOR GAS APPARATUS & MAIN-LAYING.

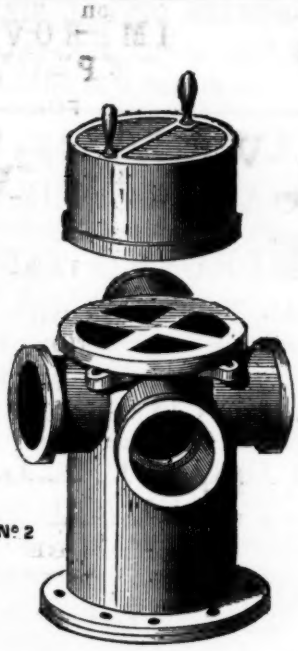
THE THORNCLIFFE IMPROVED CENTRE-VALVE,

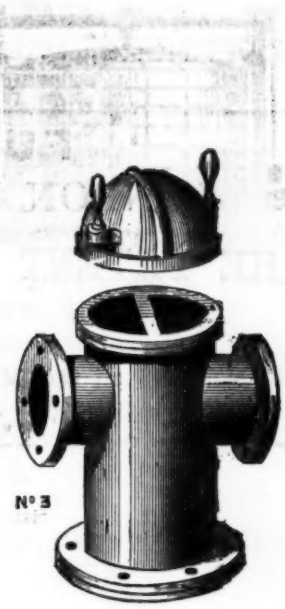
MANUFACTURED BY

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.







Sizes of the

THORNCLIFFE IMPROVED CENTRE-VALVE.

		Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A	Bore of Pipe...	4	5	6	7	8	9	10	12
B	Diam. of Body.	16	20	23	26	28	31	34	40
C	Height of Tank.	33	35	38	43	46	48	51	56
D	Depth of Cover.	8	9	10	11	12	13	14	16
	Total height...	41	44	48	54	58	61	65	72

THORNCLIFFE IMPROVED BYE-PASS VALVE.

SIZES

From 3 ins. upwards.

THORNCLIFFE IMPROVED STOP-VALVE.

SIZES

From 3 ins. upwards.

In all cases the Covers are cast heavy enough to resist any required pressure.

The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

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GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS,

And all kinds of Experimental Gas Apparatus.

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LONDON ROAD METER-WORKS, EDINBURGH,

SOLE MANUFACTURERS OF

THE PATENT IMPROVED TIN-PLATE DRY GAS-METER,

WITH SPECIAL FACILITIES FOR ADJUSTMENT AND REPAIR,

The principal parts of the mechanism being accessible by the removal of a single Screw.

GAS-METERS on the WET and DRY principles made in CAST-IRON and TIN-PLATE CASES.

STATION-METERS, GOVERNORS, EXPERIMENTAL & TEST METERS, GAS APPARATUS, &c.

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STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

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THE DUNKIRK COAL COMPANY.

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WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

A large Stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all Sizes kept in London at Mr. ALFRED WILLIAMS, Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

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SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

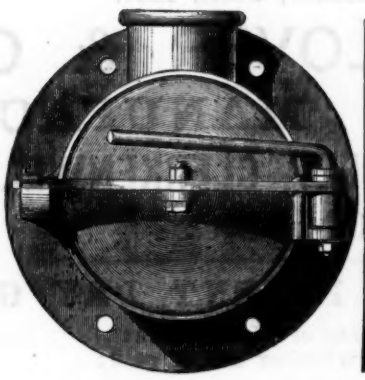
HOLMAN'S PATENT ECCENTRIC FASTENINGS.

OVER 7000 IN USE.

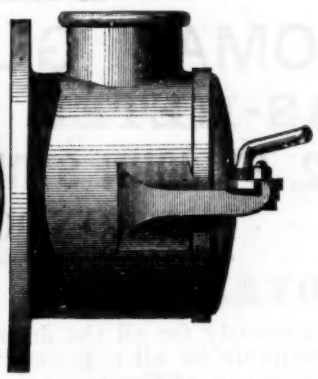
NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW.



SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

THESE LIDS ARE IN USE AT THE FOLLOWING (AMONG MANY OTHER) GAS-WORKS:—

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„ Gaslight Company, Bow Common.	„ Alliance and Dublin Gas-Works.	„ Newcastle-on-Tyne Gas-Works.
„ London Gaslight Company.	„ Edinburgh Gas-Works.	„ Carmarthen Gas-Works.
„ Independent Gaslight Company.	„ Manchester Corporation Gas-Works.	„ Merthyr Tydfil Gas-Works.
„ Phœnix Gaslight Company.	„ Salford Corporation Gas-Works.	„ Ystrad Gas-Works.
„ South Metropolitan Gaslight Company.	„ Rochdale Corporation Gas-Works.	„ St. Alban's Gas-Works.
„ West Ham Gas Company.	„ Liverpool United Gas-Works.	„ Over Darwen Gas-Works.
	„ Birkenhead Gas-Works.	„ Aylesbury Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

The following important Testimonial, among others, has been given:—

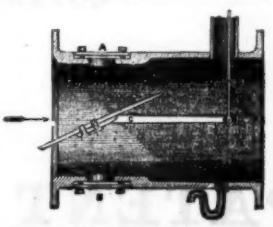
The Gaslight and Coke Company. Engineer's Office, 6, Westminster Chambers, Nov. 14, 1871.

Dear Sir,—In reply to your inquiry, I have the pleasure of stating that the whole of the Mouthpieces at Beckton have Morton's Lids attached to them, and they have given us every satisfaction. We have 2160 in use.—I remain, yours truly, (Signed) F. J. Evans.

SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communication being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber, upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.



London Gas-Works, Nine Elms, Dec. 25, 1871.

Gentlemen,—The 18-inch Hunt's Patent Throttle-Valve Governor supplied by you to this Company has been in use for about six months, working very satisfactorily; it obviates entirely the oscillation which sometimes occurs with the ordinary Governors, with the annoyance and danger arising therefrom. The efficiency of this Instrument, together with its compactness and lowness of price, ought to ensure its general adoption.

Messrs. Tangye Brothers and Holman. (Signed) Robert Morton, *Engineer.*

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3-inch.	£15 0 0	8-inch	£25 0 0	16-inch	£46 0 0
4 „	17 0 0	9 „	29 0 0	18 „	50 0 0
5 „	20 0 0	10 „	33 10 0	20 „	60 0 0
6 „	22 10 0	12 „	38 0 0	24 „	72 10 0
7 „	24 0 0	14 „	42 10 0		

CLELAND'S PATENT DIRECT STEAM-JET EXHAUSTERS.

THORNELOE'S PATENT GAS-VALVES.

TRAVELLERS AND HYDRAULIC LIFTS FOR PURIFIER-LIDS, &c.

London 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

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1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

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EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c., &c.

WATER METERS.

W. P. & Co. beg to state that they are now prepared to supply Station-Meters with planed joints.

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NOTICE TO SUBSCRIBERS.

Subscribers who desire to avail themselves of the reduction in the subscription to the JOURNAL by paying in advance, are reminded that this can only be done during the present month.

The JOURNAL has been duly registered at the General Post-Office for transmission abroad.

All communications for the Editor, remittances for subscriptions, and orders for advertisements should be addressed to the publisher, William B. King, 11, Bolt Court, Fleet Street, London, E.C.

The publication of the present No. of the JOURNAL *has been unavoidably delayed for several hours.*

PROVINCIAL GAS AND WATER COMPANIES.

The following corrections, which arrived too late for insertion in our Share List, published on the 14th inst., require to be made:—

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up per Share.	Dividend per Cent. per Annum.	Last Quotation.
	£		£ s. d.	£ s. d.	£ s. d.
4000	10	Altrincham Gas Company	7 10 0	10 p. ct.	15 0 0
400	6	Barrowstowness Coal Gaslight Co.	6 0 0	5 p. ct.	7 5 0
2000	10	Bromley Gas Consumers Company	10 0 0	10 p. ct.	15 0 0
3000	10	Do.	6 0 0	10 p. ct.	8 0 0
800	5	Biddulph, Bradley, and Black Bull Gas Company, Limited	5 0 0	5 0 0	5 0 0
180	5	Holt, Limited	5 0 0	5 0 0	5 0 0
210	10	Larne (Ireland)	10 0 0	6 0 0	10 0 0
2000	5	Normanton Gas and Water Co., Limited	5 0 0	5 0 0	7 0 0

N.B.—The "latest quotation" of "Bath D shares" was given in our list as £6 2s., instead of £11.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 28, 1873.

Notes upon Passing Events.

AT a time when every incorporated company, which has carried out public works for useful purposes and earned a profit, is liable to be attacked by the members of some municipality, anxious either for more power and patronage, or incited by the private pique of an active, pertinacious common councilman, or by the needs of a town-clerk with a large unpaid bill for which no one in particular is liable, but which may be mixed and muddled up in the general cost of a private Act, it would be well if the governing families of public companies would look over their position, and see if they have taken up the best possible attitude for defending the interests committed to their charge. There is no parallelism between the condition of the owner of a landed estate whose title is attacked in a court of law, and the shareholders of a company whose interests are attacked by a private Bill in Parliament. In the former case, all that the owner in possession has to do is to hold his tongue until his enemy has stated his case. His best policy is strictly defensive. But a water company, a gas company, or a railway company, which, under the advice of some prudent and experienced lawyer, acts upon the system of legal defence to an attack that has nothing to with law or precedent, is pursuing a suicidal policy, and is as certain to fall as a fortress besieged and not relieved. Acts of Parliament, private as well as public, are promoted and carried by public opinion. As a rule, a successful, and therefore respectable solicitor, despises, or at any rate is perfectly indifferent to public opinion. He relies on legal rights and the strength of one or more Acts of Parliament; he relies, in fact, on the elements that have secured him success in numerous contests in courts of law and equity. He advises his clients not to notice what appears in the local newspapers, and above all to avoid appearing in print. Not unfrequently he advises a course of policy as regards rents and rates which, although founded on strict law, does much more harm to the company than any benefit derived from the "pound of flesh." We find examples of some of these errors in the line pursued by more than one Provincial Public Works Company. In London the gas companies, prosperous and apathetic, are allowing themselves to be *libelled* out of a good name they have expended tens of thousands, we might say millions, to deserve. It is all very well for a great political personage to bear for a long period in silence attacks on his ability, and even his integrity, because the time comes, or at any rate he expects it will come, when he will confute or defend them, as Lord Palmerstone did more than once, in one slashing reply; but companies have no voice except that addressed to sympathizing shareholders. Railway companies are on occasion pretty well represented in Parliament; but as for gas and water companies, if they continue to conduct their defence like a trial in ejectment, they stand a good chance of being lied and libelled out of existence by ignorant hirelings.

The sanitary doctors have been running more than usually mad lately, with Mr. Rawlinson, C.B., at their head. Fresh air is an excellent thing—positively pure air one of the luxuries difficult to be enjoyed in a town life; but when it is gravely proposed by the favourite sanitary official of the Government that we shall open our windows in cold weather, and adopt the Chinese plan of extra clothing, great-coats and cloaks for a dinner or evening party, a serious question is turned into a joke. According to this theory we are to take our choice between rheumatism, sore throats, inflammation of the lungs, and all the consequences of cold draughts, and the slow poison of foul air. The difficulties of ventilation applied to houses require to be studied before they are constructed; in nine cases out of ten they are never thought of until they are inhabited. If they are thought of and mastered by the architect they cost money, and most of the people who build houses object to pay for what will not produce an obvious return of interest. An attractive *façade*, plate-glass windows, elegantly decorated living rooms, bring tenants; but how few are there who would willingly pay an extra £10 or even

£5 a year for a good system of excluding the foul smells of house sewers, ventilating overheated rooms, and protecting water-pipes in summer from being frozen in winter. The fact is that public education, and, consequently, public opinion, is very much in arrear on these questions, and the whole study is discouraged by the exaggerations of the sanitary quacks. A very sensible letter has been addressed by Dr. Hayward, Vice-President of the Liverpool Architectural Society, to a contemporary, from which we make the following extracts. It must be observed, however, that vestibules are the appendages of the houses of the well-to-do middle class only. The inhabitants of houses at £20 and £30 a year rarely have vestibules:

Because with the one we hope to prevent the cold out-door air from rushing into the house when the outer door is opened, and with the other to warm the air that is in the lobby, for in winter it is otherwise too cold, not only to be admitted into the rooms, but too cold for persons to pass through from one room to another. The very existence of such contrivances to keep out the cold air, and especially their more general adoption of late, prove their real necessity for the general public, notwithstanding that Mr. Rawlinson and Dr. Rickards do not find them necessary for their own persons. All are not made of such tough stuff as they are. One man being able to go in the winter and break the ice of the open lake to have his morning bath, or another to live and even sleep in the open air, is no argument that such conduct would be good for the general public. The facts are that, for the general public, houses are necessary to live in and warm rooms to sleep in; and for the health and comfort of all, it is necessary that houses should be ventilated and warmed throughout.

To provide general warmth and ventilation in new houses is no great difficulty and no great extra expense. Let all houses have vestibule doors and lobbies, or other common space, for fresh air; let the out-door air be admitted directly into this common space between hot-water pipes through an opening in the external wall, controlled by a valve, to regulate the supply according to the number of occupants; let all the room doors open out of this common space; let the fresh air be admitted into the rooms from the lobby by any kind of opening besides the doorway; let each room have a special exit opening in or near the ceiling; let this opening be connected with a tube between the joists; let this tube run to a flue in an inner wall; let all the flues end in a common receptacle at the top of the house, from each room separately; let this common receptacle determine in one common flue; and let this common exit-flue be kept permanently heated. The common exit-flue, being hot, will suck the foul air equally and continuously from every room in the house, and the rooms will receive a continual supply of fresh warmed air from the lobby, and the whole house will be warmed and ventilated throughout. The common exit-flue may be kept permanently heated for a small cost by a gas-jet or by a few coils of the warming apparatus pipe; or for no cost by carrying it down to below and up behind the kitchen fire and round the smoke-flue. This plan has been adopted and proved, and may be seen in operation in my own house and that of Dr. Drysdale. It is perfectly and completely successful; the whole house and every individual room may be emptied and replenished every 20 minutes with pure air at a temperature of from 60° to 65° the whole winter through.

On the same question Mrs. Garrett-Anderson, who always speaks with strong common sense, writes: "Strongly as I feel the importance "of pure air, I believe far more harm than good would be done if old "people, or delicate people, or children, attempted to act upon Mr. "Rawlinson's suggestion, and sat in wintry weather in shawls and "top-coats and windows open." Mrs. Anderson recommends Boyd's, or some other ventilating fire-place, and Sheringham's ventilators. But where there is a fire, there is a means of getting rid of used-up air.

The last story of official sanitarism run mad comes from Norfolk, where a London inspector, sent to report on a village of two hundred inhabitants, began by asking for "the main sewer," and ended by recommending that all the open garden privies should be suppressed in favour of water-closets. It would be absurd to deny that, in consequence of the befoulment of drinking water and the accumulation of decaying matter, it often happens that typhus and scarlet fever are generated in a village which, externally, is a picture of rural beauty. But some remedies are worse than the disease, and the water-closet, which requires skilful management, is one of these fatal remedies. An official sanitary scavenger, at from 16s. to a pound a week, may be usefully and profitably employed in almost every village of two hundred inhabitants. His duties would be very simple—to see that the contents of privies, pigstyes, and dust-holes are removed to make garden manure before they become offensive. The Rev. Henry Moule has taught us a good deal that does not involve the use of his patent process. Ashes or dry earth daily applied as a top covering to excreta neutralize poisonous miasma. That is one point. Another is careful provisions against the befouling of the drinking water of the village by the drainage from ash-pitts or cesspools. A man of no higher grade than an intelligent gardener can see to such matters, at once trifling and important in a population so insignificant that the complete plans of your sanitary doctors would involve financial ruin and perpetual stinks.

The constant rain-pour that has succeeded a cycle of droughty seasons will have very important effects. Even the well-drained, retentive soils had begun to suffer from overcharged moisture before a few days of passing wind and sunshine relieved the monotony of perpetual down-pour. The undrained clays are simply one hopeless morass, on which neither man nor beast, plough-horse, nor ox, nor sheep can tread for an unlimited period. This will be a lesson the dullest can learn, from which the most prejudiced can profit. After this season no tenant worth having will remain on or take a farm of undrained, stiff soil. Steam cultivation, too, has made an enormous advance in the favour of the agricultural world. Mr. A. Sussex Milbanke writes:

The home farm at Barningham Park is situated in the narrowest part of England, in the north-west of Yorkshire, about 35 miles between sea and ocean, at an altitude of 600 feet. Within one mile from the farm the dreary wastes of Yorkshire moorlands, devoted solely to the realms of "King Grouse," stretch themselves beyond the confines of Lancashire. No less than 56½ inches of rain fell there during 1872, equal to over 5600 tons of water to the acre. These conditions are not very favourable to wheat autumnal cultivation, yet, in spite of 5½ inches of rain in October, I was enabled on my heavy land to sow 40 acres of wheat. It is rare this year to find any wheat sown in the north of England. My wheat has come up well; and now, in the latter part of January, it is the general observation how promising it looks. To what cause, then, do I owe so successful an issue to my venture after a downfall so unexampled in the annals of modern agriculture? Without doubt, primarily, to thorough deep drainage—drains 11 yards apart, 4½ feet deep, assisted by previous deep stirring of the land by Fowler's double steam-engine apparatus. Thus, by the rapid filtering of the rain through the soil, a 24 hours north wind enabled me to "catch" a season. Success is due to the two systems in combination—those of deep drainage and steam cultivation. Not only is the water never stagnant, but, airing the soil, and perhaps even manuring it with the gases of the atmosphere above, prevents the plants from rotting.

The Commissioners of Sewers in the City of London do their work well, and would do it much better if there were twenty of them instead of about seventy. As it is the public has only to complain of wasted power and too much talk. Fortunately, their works are better than their speeches. Mr. Bedford, a highly creditable chairman, gave an example of the City of London disease in a parting speech on retiring from office. That he should sum up the work of the commission over which he had presided, was natural and proper; but that he should enter into a bitter criticism of the financial operations of a concurrent authority, was dreadfully "Little Pedling-"tonian." Mr. Bedford took credit for the way in which the scavenging department was performed, as it should be, without regard to expense, efficiency being the first consideration. It seems that the City paving is done for a rate of 4d. in the pound, cleansing for 2d., lighting for 1½d., and with salaries, interest, and repayment of loans—altogether a rate of 10d. in the pound, which cannot be considered other than moderate in the richest and most thickly populated city in the world, for traffic and smoke make dirt. But Mr. Bedford was not satisfied without comparing things which are not at all parallel. He found fault with the Metropolitan Board—which exists only to do great public works by means of borrowed money—for paying away 53 per cent. of its income on interest and the repayment of loans. The Board has a great debt incurred in necessary work, and must meet current interest and sinking-fund. The objection is the objection of a lawyer rather than of a financier. The time will come sooner than is expected—suddenly, like all great social and political changes—when the Commission of Sewers and the Metropolitan Board will be swallowed up in a re-formed metropolitan municipality.

Meetings continue to be held under pretence of procuring a mitigation of the punishment of the conspiring convicted gas stokers—in reality to denounce the state of the law that permitted them to be punished at all. The fact is, the workmen who take part in these demonstrations demand a licence which, if granted, could only end in such anarchy as the Communists established in Paris. The leading agitators are Communists, and with Communists peaceable industrious people of every rank can have no compromise.

A commentator in the statistics of imports, noticing the immense number of eggs brought from France and Belgium, asks the question, "Where are our hens?" and Mr. Wright, an eminent authority on this, answers the question in a long letter to *The Times*. He gives some very useful hints, quite within the reach of every farmer and cottager, for improving the qualities and quantities of the ordinary domestic fowl; but, when every effort has been made, the fact remains that our climate is not favourable for breeding chickens, and we must breed chickens to have laying hens. A dry climate, a light or sandy soil, plenty of insect life, and a supply of two grains which cannot be profitably grown in this country—maize and buckwheat—these are the conditions most favourable to plenty of eggs, capons, and poulardes.

A paper read at the Institution of Civil Engineers by Colonel W. H. Greathed, C.B., R.E., Chief Engineer of Irrigation to the Government of the North-Western Provinces, "On the Results of Irriga-"tion in Northern India," gives a satisfactory idea of the progress that has been made in food producing and reproductive public works since General Arthur Cotton first called the attention of the British public to the necessity of continuing and reviving the operations which had reflected so much glory on the Mahomedan conquerors we have superseded. The Ganges Canal and Irrigation Works were, as is well known, from mistakes in execution in the first instance, a failure. The hydraulic errors, recorded unconsciously in a magnificent folio, have, as we understand, been partially amended. "The "earnings of a cubic foot of water on the Ganges Canal in 1870-71 were "£44 per annum; on the eastern junction, £59; the net income of all "the canals in the North-Western Provinces, after payment of "working, paid 6·64 per cent. on the capital cost of £2,700,000." Measures were in progress for reducing the rapidity of the current of the Ganges Canal, now too swift for navigation traffic, and a commencement had at last been made in leasing the water power to persons competent to utilize it. A Lower Ganges Canal has been planned, at a cost of £1,825,000. The combined system would cost £5,000,000, and return 13 per cent. The Agra Canal was designed to irrigate 350,000 acres, and an Eastern Ganges Canal would water 450,000 acres. The Belwa Canal, in the Bundelcund zone, at an estimated cost of £170,000, would water 120,000 acres, and pay 10 per cent. Other weirs were projected, estimated to cost a quarter of a million, and return 11 per cent. Lastly, 15 lakes in Bundelcund would be made available to water 22,000 acres, and to return £2500 upon a capital outlay of £8200. By these means 700,000 acres—an area sufficient to secure the province against famine—would be watered with a fair chance of restoring its ancient fertility.

The financial results were then explained. At the end of the year 1871 upwards of a million acres were irrigated from existing works, which afforded a net return of £182,500. The capital expended had been £2,747,000, and the net profit on the whole was 6·64 per cent. When fully completed the cost of the undertakings would amount to about £7,500,000, with a return of 12 per cent. on the capital when the canals were fully developed.

A large system of canals had been projected for the irrigation of the province of Oude, from the river Sardah, and would extend to some part of the Benares division.

In the Punjaub, at the foot of the Himalaya, there was a zone of rainfall of

40 inches a year, bounded on the south by a belt where the rainfall was 16 inches; the remaining country to the south was almost rainless. The principal canal in operation was the Western Jumna, an old Mahomedan work. It had paid nearly £2,000,000 clear profit, after repaying capital. The Baree Doab Canal, taken from the river Ravee, was constructed on the model of the Ganges Canal, and was gradually making way.

There were profitable inundation canals on the Indus, the Chenab, and the Sutlej. The Sirhind Canal, now under construction, would cost about £2,000,000, and irrigate a country where rain was very scarce. It was calculated to pay about 9 per cent.

It was observed that whilst the characteristics of irrigation in the North-Western Provinces, Oude, and the Punjaub were much alike, they differed largely from the conditions current in Madras. In Northern India irrigation was carried over the whole country; crops were watered both in winter and in summer, and irrigation afforded the greatest benefit in the winter, when there was little or no rain; but in Madras canal irrigation was only effected during the rainy season when rivers were full, and was confined to the deltas at the mouths of the great rivers.

About 250 engineers, of and above the rank of assistant-engineers, are employed under the Indian Department of Irrigation.

It may be safely asserted that these are some of the results of a series of measures almost universally condemned by "old Indians." When General Arthur Cotton commenced his agitation in favour of canals and irrigation works, he was spoken of as a traitor to the Indian service, in which he then held the rank of lieut.-colonel. He was one of the pioneers against the do-nothing Indian policy—against the let-ill-alone theory. He has lived to see the triumph of a great cause—water, previously wasted, stored; famine, the result of drought, driven away; the commencement of a cheap system of canal conveyance.

A discussion on over-work, started by some very sound remarks in the *Lancet*, has been going the round of the papers not, of course, without some cynical remarks from the *Saturday Review*. It is quite true that men in sound condition are seldom injured by literary or scientific labour of any kind; the exceptions are in youths straining for some prize—some scholarship, fellowship, or other University honours and profits—or the exceptional instances where a man of weakly constitution is so absorbed in one pursuit that he neglects the ordinary securities for health—exercise, food, relaxation. The great enemy of health at the present day is *anxiety*—all-absorbing thoughts that give no rest to the brain by day and by night. These are principally associated with greedy money speculators. The greatest number of victims will be found amongst speculators in stocks and shares, and gamblers on the race-course. What amount of work of a healthy kind a man may do can be gathered from the annals of our law courts and of our Parliament. Judges live to beyond the average age of man. We do not often hear of the leaders of the Bar dying in harness of over-work. To be sure they have the advantage of long vacations. But the labours of the barrister in the fullest practice are insignificant as compared with those of a Secretary of State, who has to work all day, and sit up, to be badgered half the night, in the House of Commons. Yet taking these, too, who have been men of society as well as politicians and debaters, how few break down. A man must have as much sleep as he requires; some need fully eight hours, others are perfectly rested with five or six. A man must have as much food as he can digest; some require four times as much as others. A man must have as much exercise as he requires, in order to preserve his appetite and secure calm sleep; but many hard-working men require no more exercise than conversation. Given calm sleep and good digestion, and a man may do as much work as he can pack into all the working hours of the twenty-four. The men who work hardest and live the longest will generally be found to enjoy the services of a good plain cook, to take a bath regularly, cold or tepid, according to constitution, and to take regular walking or horse exercise. But he who cannot sleep at night must sleep by day; rest and supply of waste are essential. With these, and warmth and fresh air, a strong man can do an incredible amount of work.

Mr. Henry Cole, C.B., has announced that after 50 years employment under Government he is about to take a pension and retire—not, however, into private life, we suspect. He will transfer his unexhausted energies to "fresh fields and pastures new." Perhaps that extraordinary specimen of commercial travellers arts, the Albert Hall, will retain his valuable services, in the hope that the people who yielded to the flattering tales of Scott and Cole, and paid their five hundreds and thousands for private boxes, may see back some small amount of interest. At present, the Albert Hall, without paying its expenses, is doing a good deal of harm to every attempt at classical and respectable music. The Albert Hall occupies in secular pursuits the same position that the Tract and Christian Knowledge Societies do in religious business. The Albert Concerts are carried out regardless of profit; the religious societies sell stationery, slates, and pencils, manufacture books with paste and scissors, and keep up a most unhealthy competition with publishers and booksellers on the strength of a large subscribed capital.

The metropolis is still far from the advantages of a constant water supply. The Board of Trade has placed itself in the hands of persons of no practical experience, and adopted a series of regulations that make the remedy worse than the disease. It would, to those who do not know the perversity of our sanitary authorities, have seemed a natural course to call in the assistance of the President of the Institution of Civil Engineers, whose name is identified with constant supply. The Mile End, the Whitechapel, and the Lambeth Vestries, have all passed resolutions condemning the Board of Trade rules. The following is the Mile End resolution:—

That, notwithstanding the advantages which may be expected to arise from a constant supply of water in this district, the regulations adopted by the Board of Trade are so unsatisfactory, and would lead to such an enormous expense, and be a source of such annoyance to consumers, that the vestry hope the Metropolitan Board will resist them, even to refusing a constant supply of water on such vexatious conditions.

THE NATIVE GUANO COMPANY AT CROSSNESS.

WE publish to-day, with some hesitation, the reports of the officers of the Metropolitan Board of Works on the experiment made by the Native Guano Company at Crossness. Strictly speaking, it is not yet a public document, but as any mischief which may have resulted from their premature publication is already done—and some, perhaps, have suffered—no harm can result from our giving them greater publicity. The reports were, no doubt, looked for with great anxiety on the Stock Exchange, but how they became public is not yet explained.

The Native Guano Company is unfortunate. After some years of operations they are still in the experimental stage. A large amount of capital has been expended, but no profit, we believe, has yet been realized on the operations of the company. After proclaiming for years that they can produce for about 50s. a ton, a manure of which any quantity can be sold for £3 10s. a ton—a profit which ought to have brought their process into use in every sewered town in the kingdom—they are still bidding for offers. We do not say that the reports we publish will be fatal to the company, but it certainly places them in a position it will be difficult to escape from. Mr. Bazalgette reports that the company operated upon 11,672,737 gallons of sewage; that the cost of the operations, exclusive of rent, interest of capital, depreciation of plant, &c., amounted to £895 3s. 3d. The result was 141·72 tons of native guano, which, therefore, cost £6 4s. 4d. per ton.

Mr. Keates goes more into detail. He shows that to extract 61 tons of material from the sewage, 81 tons were added in the shape of dry A. B. C. mixture. In reality, 166 tons of the A. B. C. mixture were employed; but Mr. Keates states that it contained more than 50 per cent. of moisture, and we are taking only the dry material into account. Now, what is the manure worth when it has been obtained? Mr. Keates, estimating on the usual chemical data, says 19s. 8d. per ton, or in a round number £1. It costs, according to Mr. Bazalgette, £6 4s. 4d. per ton, and, at the best, is only saleable for £3 10s. Mr. Keates, we may as well say, has, in one instance, over-estimated the value, for he has calculated for *soluble* phosphate of lime, which is not present, but the difference is not significant. We may at once express our agreement with Mr. Keates in a doubt whether the fertilizing power of a manure can be accurately estimated by its chemical composition. But, in this case, as our readers will see, there is 99 per cent. of absolutely inert matter in the manure; a fact of great importance when the cost of carriage alone is taken into consideration. The manure made with so much trouble looks, indeed, very much like road sweepings, with the addition of a small amount of phosphate of lime in the form of animal charcoal.

As regards the clarification of the sewage—*cela va sans dire*. When the process is properly carried out, as it appears to have been at Crossness, all suspended matters are effectually removed; and if all the sewage at the two outfalls were so treated, much dredging of the Thames might be saved. But the advantage seems to end here, for the dissolved matters pass in the effluent water. The sewage experimented upon was extremely weak, and that will account for the comparative purity of the effluent stream. A stronger sewage would, no doubt, have been as perfectly defecated, but then probably the effluent water would for a time have had a more offensive character. Still, we believe it would to most persons, though not to Dr. Frankland, appear in a fit state to be admitted into any river with a good volume of water. It must, indeed, be admitted, that the A. B. C. process offers an effectual means of defecating sewage; but at what cost? In these experiments the expense of defecating 11,672,737 gallons was, according to Mr. Bazalgette, £895 3s. 3d., or just about £81 per million gallons. This fact at once disposes of it as a merely defecating process, and if the manure produced at a cost of £6 6s. 4d. per ton could only be sold (it does not appear that it was sold) for £3 10s., while its intrinsic value was barely £1 per ton, the hope of making a profit on manure vanishes.

We shall probably have explanations and expostulations, and as regards the quality of the sewage there is something to be said. It was no doubt "very weak," and it may be that with what we may call normal London sewage twice the quantity of manure might have been produced at the same cost. But we are bound to take the facts as they are reported, and can only believe that they are unfavourable to the pretensions of the Native Guano Company.

Circular to Gas Companies.

WITH coal still rising, instead of, as we were led to hope, falling in price, it is not likely that the Metropolitan Board of Works will exercise their power of applying to the Board of Trade for a revision of the price of gas. If the committee to whom the petition of the inhabitants of Kensington is referred will fairly consider the matter, they will see that the petitioners are without reasonable ground of complaint, at all events as regards the price demanded for 23-candle gas. Cannel gas may be a grievance, and we are far from saying that it is not, but the price asked is perfectly justified by law and by the cost of production. Any reader who will look at the prices of cannel coal we publish to-day, and will refer to the prices quoted twelve months ago, will only wonder that the gas is not dearer. If the inhabitants of Kensington, following the example of the Metropolitan Board at Spring Gardens, will consume their cannel gas in improper burners, and so are unable to distinguish the difference in the light given by that and the light afforded by 16-candle common gas, that is their business. The fact, however, is beyond dispute that, properly

consumed, one-third less of 23-candle gas will afford the light given by any consumption of 16-candle gas, and thus the cost of light is equal in two districts—one supplied with common gas at 3s. 9d., and the other with 23-candle cannel gas at 5s. 5d. As a matter of fact the cannel gas is rather the cheaper. Still we may join with the petitioners in advocating the substitution of a supply of common for cannel gas. Much advantage would be derived from a supply of gas as nearly uniform in quality as possible all over the metropolis; and besides this, we think that the companies should do all in their power to encourage a large day consumption for culinary and industrial purposes, for which rich illuminating gas is not so well adapted.

The delegates of the metropolitan vestries, who have met at St. Martin's-in-the-Fields, have come, we are bound to say, to some rational conclusions. They recommend that the provisions of the City of London Gas Act and the Acts of the South Metropolitan and Imperial Companies, so far as they relate to the quality of the gas and to the supervision of companies, should be extended to all the companies in the metropolitan district. This might be accepted by the companies, but the further recommendation that the maximum price of gas should not exceed 3s. 6d. is simply absurd. It is a gross injustice to fix a maximum price at all when the costs of production are known to be increasing. Why all vestries and District Boards should be compelled to appoint gas examiners when such examiners are appointed by the Board of Works we cannot conceive, but we suppose the vestrymen are anxious to increase their patronage. The adoption of the average meter indication system in the supply of public lamps in the metropolis is now continually brought forward, and soon will require the serious consideration of the companies.

While this agitation against the companies is going on in London, we find the Corporation of Huddersfield raising the price of gas and lowering discounts without any remonstrance from the consumers, who would rather seem to wish the price raised still higher. So far the gas undertaking has not been very profitable to the Corporation, and there are probably many in Huddersfield who wish it had remained in the hands of the company. The Town Council, however, are fully conscious of their responsibilities. There is none of the wild talk which characterizes the London Local Boards when they deal with gas matters. The council know that the cost of gas has increased, and is still increasing, and that any advance of price of coke and other products by no means compensates for the rise. The Metropolitan Board of Works should know this also, but the temptation to cultivate a cheap popularity at the expense of the gas companies is too strong for most of the members. If they had the supply of gas in their own hands they might, perhaps, talk more rationally.

The Corporation of Dublin have adopted the very sensible course of consulting the Chamber of Commerce relative to the proposed purchase of the gas company. It may be fairly conjectured that the Chamber of Commerce is represented by the most eminent commercial men in the city, whose opinion will be most valuable. As we understand it, the question is the propriety of the terms of purchase agreed upon and specified in the Bill of the Corporation, rather than the more abstract one of the propriety of the Corporation becoming the possessors of the gas undertaking, and yet this latter ought certainly to be considered by a "Chamber of Commerce." We should be glad to have the opinion of a committee of independent merchants on this important question.

We report to-day some proceeding at Waterford which are of much interest to all lessees of gas undertakings. There is probably no other place in which the same conditions obtain as at Waterford, and we refrain from making the reflections which such a state of things suggest. What is of importance to know is that a collector, appointed by a contractor, and approved by a Corporation, has power to distrain for a lamp-tax levied by a Corporation. The technical objections urged in the case were contemptible.

We must also draw attention to the case of the *Pudsey Coal Gas Company v. The Mayor and Corporation of Bradford*. The latter seem to be taking a mean advantage of a defect in the Pudsey Gas Act, and are pushing their mains into the district of the company as a competing undertaking. This is not at all creditable to the Corporation, who possess exclusive rights within their own limits, so that the Pudsey Company could not retaliate if they wished. There seems, however, to be no help for it, and for the future we hope gas companies, especially in the neighbourhood of aggressive Corporations, will be careful to seek for prohibitive clauses.

Ecce iterum! Another inventor has come forward with a NEW gas, and found people in the City of London to contract to pay him £125,000 for his invention. And what is the invention? We will quote the specification of one patent which is included in the purchase. It is No. 3504, A.D. 1871. The italics, capitals, and remarks in parentheses are, of course, are own:—

> I propose to employ hydrocarbon spirit, with which I mix about 10 per cent. by measure of caustic alkali, such as caustic lime or caustic soda. [Ten gallons of caustic soda to 100 gallons of spirit!] These ingredients being placed in a suitable vessel or receptacle, and covered after the manner of a gasometer, are subjected to the action of air, which is forced through the vessel or receptacle by means of a force-pump or other suitable means of pressure, in order that the atmospheric air may commingle with the hydrocarbon, and fill the gasometer with a pure air gas, the oxygen of which will, of course, increase the power of combustion. More or less of the *spirit will consequently be decomposed by the caustic alkali according to the volatility of the liquid employed. The nitrogen of the air will be* DECOMPOSED, *or neutralized by the caustic alkali, but some may pass off as a diluent to the mixed air and gas, and consequently aid in the combustion, not by direct action, but by dissemination of atoms.* The addition or admixture of caustic alkali neutralizes the *phenic acid* contained in the spirit [light petroleum!!], and otherwise effects organic changes in the hydrocarbon, rendering it more free to be acted on by the flow or current of atmospheric air.

Greater nonsense than this was never written—denser ignorance was never displayed. We have called it nonsense, but it is really something more. Not an atom of light hydrocarbon oil will be decomposed by the caustic alkali, lime, or soda; and the idea that the nitrogen of the air would be decomposed, could only be entertained by a man absolutely ignorant of the simplest rudimentary facts of chemistry. We stop here for a moment to remark that the fact that the Great Seal has been affixed to such a specification as this is sufficient in itself to justify the demand for an immediate revision of the Patent law under which such a scandal has arisen. But to return. This is only one patent. The Messrs. Harrison with "air gas" literally took the wind out of this invention; and another had to be provided. The specification of this has not yet been published; and we have to learn what it is from the prospectus of the "New Gas Company," and the accompanying reports. By these we are told that in place of air a specially prepared gas of a permanent character is employed for carburization. It is made by a process some forty years old, which has been patented a dozen times. Superheated steam is passed over red-hot carbon, and therefore the gas is a mixture of *carbonic oxide*, hydrogen, and some carbonic acid. Apart from its employment for carburization, this mixture is said, with truth, to constitute a powerful heating gas, and capitalists are tempted with the hope that the supply of the mixture for heating purposes may bring an important revenue to the company. But has any one of the gentlemen who have contributed these reports reflected upon the possible consequences of the introduction of this gas into houses? Carbonic oxide is one of the most poisonous gases known. Unlike coal gas and carbonic acid, which kill not from any specially poisonous property, but by taking the place of the life-sustaining oxygen, carbonic oxide, even when largely diluted with air, kills and kills quickly by virtue of its own inherent deadly agency. An escape of this gas, such as takes place in many houses every day with coal gas, would be certain death to every inhabitant. Some years ago the French Government refused to sanction a scheme for the distribution of such a compound about Paris, on account of the double danger attending its use. And what advantage, so far as light is concerned, does this poisonous compound possess over common air? None whatever, we believe. On the contrary, the compound experimented with and reported upon is eminently disadvantageous. Hydrogen and carbonic oxide have next to no illuminating power without the petroleum vapour; but besides these the gas contains 12 per cent. of carbonic acid. Now 12 per cent. of carbonic acid in coal gas reduces the illuminating power 40 per cent. A similar result appears to follow with this compound. An illuminating power of 16·6 candles is claimed for the carburetted mixture, but an ex-referee estimated the illuminating power of "air "gas" at 30 candles. So far then simple air has an enormous advantage for carburetting purposes, and is comparatively free from danger. Of course the carbonic acid can be removed, but the means proposed by this inventor is one of the absurdest features in his process. Fancy a man buying caustic soda to convert into carbonate, and expecting to make a profit by the operation!

Unfortunately, the space at our disposal here will not allow us to expose one-half the absurdities contained in these papers; but the loose way in which the prospectus is drawn must attract every one's attention. We are told in one place that one of the advantages of the process is a saving of labour in gas making to the extent of 50 per cent. In another paragraph we read that the saving is *the labour of* 29 *men out of* 30, which looks considerably more than 50 per cent. Our duty to the public may compel us to return to this subject. For the moment we have done. Gas companies can afford to laugh at schemes such as this, but there may be not a few who, in the long run, will mourn over them. According to Mr. Carlyle and many other philosophers, the great bulk of humanity is made up of that class who, it is proverbial, are quickly separated from their cash—a fact abundantly proved in the City six days in every week.

Some of the above remarks may lead our readers to suppose that we support the air gas scheme, which is by no means our intention. When we say that it may be in some respects superior to the scheme above referred to, it is saying very little in its favour. We wait the trial, which is shortly to be made at the Crystal Palace, with some curiosity. It is the intention of the company, we understand, to light one-half the Palace, so that the effect may be contrasted with that produced by the gas of the Crystal Palace Gas Company on the other side. So far all is fair and above board. The result we will not predict. Will the directors of the Air Gas Company imitate those of the Patent Gas, and appoint some independent and competent authorities to watch over the experiment?

The letter of Mr. Bower on the patent gas question calls for no remarks, since he only touches on points to which we have already referred. The suggestion, however, with which he concludes, coming from so eminent an authority on gas making, is worthy the attention of all gas engineers. "We want," he says, "a continuous "mechanical method of charging and discharging retorts, entirely "different to anything yet produced, which shall be rapid in action "and produce good coke. This is the direction in which inventive "genius should work." We believe Mr. Bower is right.

Correspondence.

GRAHAM'S CAM TELL-TALE MOTION.

SIR,—I send you a photograph of a cam tell-tale motion, which I have applied to one of our station-meters, and which has been in successful operation for several months.

Originally the meter was supplied with one of Lowe's eccentric tell-tale motions, which, as your readers will be aware, produced a wave curve, in which

it was difficult to determine the exact points where the hourly make began and terminated.

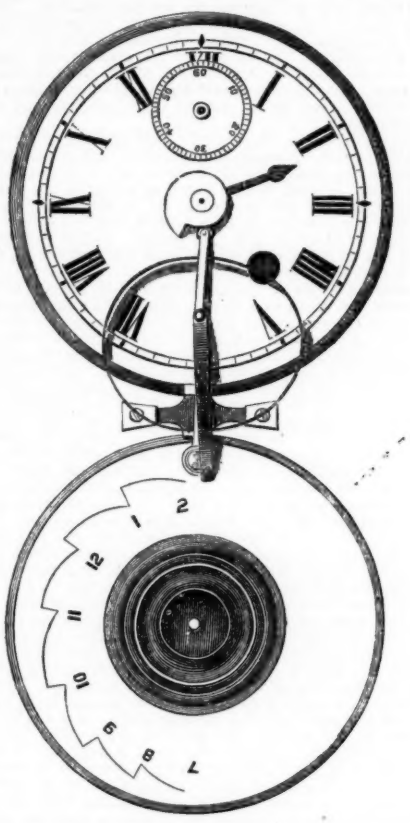
This motion produces what may be denominated a saw-curve, the hourly terminals of which are radial straight lines, and therefore enable an observer to determine the comparative amounts of gas made each hour with greater certainty and precision.

The motion consists of a cam fixed on the end of the hour handle, which is kept in contact with a pulley fixed on one extremity of the bar which carries the marking-pencil. The pencil is kept in position in a manner similar to that adopted by Lowe, and a circular spring is fixed on the brass cross-guide bar, which is also soldered on to the side of the pencil-bar in such manner as gently presses the bar upwards, so as to bring its pulley in continual contact with the cam.

The cam is of the spiral description, and is constructed by dividing it from its centre by a number of equal angles, the rise of the curve of the cam being made equal for each division.

The pulley which transfers motion from the cam to the pencil-bar, should not have its centre in a line with the pencil and the centre of the hour-handle, but as much out of that line as the pitch of the cam, in the opposite direction to that in which the cam moves. The object of this is to prevent jerking, and it will also reduce the friction to a minimum, so that the motion of the pulley on the angle of the cam, will more nearly resemble its motion over a level path.

The circular spring need only be a little stronger than what is necessary to push up the guide-rod, and keep its pully in contact with the cam, so as to throw no unnecessary work upon the pendulum, and springs of the clock.



The diagram centre is driven from the thousands centre, in a manner similar to that used by Lowe; but it would be better to have three sets of gear, one for summer, one for winter, and another for the spring and autumn months, and these ought to be fixed *outside* the face, where the intermediate, and centre wheels, could be easily and conveniently changed and geared according as it was found necessary to do so.

Too small, or too short an hourly diagram, is next to useless for the detection of faults in the makes; it is, therefore, perhaps better to use only 12-hour diagrams, or, with large centres, 24-hour, and change the wheel-work whenever the hourly figures become too short or too long, and threaten to override each other.

Times of charging, or irregularities, can be detected by the form the curve assumes under various circumstances, showing itself in elongations, flats, inverts, and sharp turns.

If the makes were uniform, the curves would be uniform and symmetrical, and deviations can easily be traced to their proper source.

It would be easy to apply this motion to a web diagram, to which the compasses could be applied to the hourly makes with more accuracy than they could conveniently be applied to the measurement of the length of the chords of the arcs of a circular diagram, inasmuch as the chord is not proportional to the length of the arc, whose length is the true measure of the make.

Stalybridge. DAVID ALLAN GRAHAM.

CANNEL GAS IN SIGNAL LAMPS.

SIR,—An old shopmate of mine, a gas-fitter by trade, who left it some five years ago and obtained employment on the railway, and is now a driver, says that *cannel* gas burnt in their signals is not seen so far as common *coal* gas, although when nearer to it, it seems lighter and brighter, but the extra illuminating power of cannel when *close to*, is not borne out in a long distance, and that it is a fact that 5 feet per hour of about 15-candle (coal gas) is seen farther than 4½ feet of 20-candle (*cannel* gas). Perhaps you have noticed it or can give some reason for it. E. J.

[A French experimenter, whose name we forget for the moment, ascertained a few years ago that yellow was the coloured light that could be seen from the greatest distance, and the difference in the colour of the flame of well-burnt cannel gas and of common gas will probably explain the observation of the engine-driver, which is no doubt correct.—ED. J. G. L.]

THE PATENT GAS.

SIR,—The published report of Messrs. Odling and Keates on the patent gas enables us now to form a tolerably accurate estimate of its commercial value.

It is, however, very evident that the report itself was not sufficient for those who wield the destinies of the company, but that a further report upon it by the company's consulting engineer was necessary before the original could be published. The two—that is, the report and the *report* upon the *report*—are now public property, and may be dealt with as such.

I quite expected, after Mr. Mellor's emphatic contradiction, by his letter of the 8th of last May, of the opinion and assertions I had made in my letter, which was inserted in the JOURNAL OF GAS LIGHTING, dated the 9th of April, that the report, when it did appear, would put me to confusion; for we were told that the directors would refrain from replying to such letters as mine, as they "preferred to rest on hard, indisputable facts, and on these, and these only, were they content to stand or fall."

Well, we have now arrived at some "facts," and let us see what they are; but, first, let us recall what they were stated to be.

1. That by the Eveleigh process a larger quantity and better quality of gas could be obtained than by the ordinary process.

2. That the gas distilled by this patent process retained its illuminating power and permanency.

3. That the coke was harder, better, and less friable when the coal was distilled at a low than when it was distilled at a high heat.

4. Less sulphur compounds at a low than at a high heat.

5. That the first distillation gave 8000 feet of 23-candle gas and 36 gallons of oily tar.

6. That, by the addition of the oil, 10,500 to 11,500 cubic feet of 20-candle gas were produced per ton of coal and oil.

7. That the fuel for the double process was little, if any, more than by the ordinary method.

8. That neither labour, nor wear and tear, was more by the Eveleigh than by the high temperature system; and

Lastly, that there was no difficulty in the manipulation, no choking of pipes, nor complication in any of the apparatus.

The better plan will be to test all these bold assertions of "facts" by Dr. Odling and Mr. Keates's report itself, and in consecutive order.

1. The same answer given below in my numbers 5 and 6 also answers this.

2. In a mean temperature of 37° Fahr. the Eveleigh gas lost in illuminating power *one per cent. per day;* and no doubt it would be much more in lower temperatures.

3. In my former remarks on this patent I stated that the coke would "be extremely friable when distilled at the low heat named in the patent (viz., from 600° to 1000°); and, although Dr. Odling and Mr. Keates say the coke is good, yet it must be borne in mind that *they distilled this coal at a mean temperature of about* 1400°, *or nearly double that named in the patent;* and the report, therefore, does not in any way affect the assertion I made, which was based on the very low temperature.

4. No man who knows anything of the subject will deny that coal distilled at low heats produces little of sulphur compounds, and that they are not so obstinate to deal with as when gas is produced at excessive heats; but this sulphur bugbear is made much more of than it deserves, and the difference between the Eveleigh quantity and that now sent out from Beckton is so little as not to be worth consideration. Commercially it is far better to distil at a high heat, and produce the larger quantity and remove the excess, as at Beckton, than to distil at a low heat and produce only the smaller quantity. The first infant poisoned with 10 or 12 grains of sulphur in 100 cubic feet of gas should be sent to the British Museum as a curiosity.

5 & 6. At this much higher temperature, and after a thoroughly practical trial under conditions the most favourable that could be presented to the experimenters, by distilling 22 tons of coal and 866 gallons of oil, *the product of more than double the coal distilled, the yield of gas was but a very little over* 8000 *cubic feet per ton of coal and oil combined.* The yield of oily tar was only about 16 gallons per ton, and why the experiments were not made after the first ton had been distilled with its oily product and a ton of coal (less the weight of the 16 gallons of oil) and the oil I cannot understand. It seems to me that this would have given more definite results than by using an amount of oil with each ton of coal 2½ times greater than the ton could produce.

7. The fuel account, instead of "being little, if any, more," was *more than one-half of all that was produced, or more than double what it is ordinarily!*

8. Let the experimenters contradict this assertion in their own words, which are that there was an enhanced "cost of working incidental to the length o time occupied by the coal in the retorts, and the increased expense of plant fuel, and wages."

9. As to there being no difficulty in the manipulation, let the report be examined, and it will be found that the number of stoppages during these experiments *with an apparatus in special condition*, was very numerous.

Now, where are the "incontrovertible facts"? Why, converted into pure fiction!

It must be borne in mind that the patent rests upon the double distillation at temperatures between 600° and 1000° Fahr., and that no claim could possibly be made to the distillation of coal only at low temperatures, for independently of other "incontrovertible facts," Mr. Mellor, in his letter of May 9, distinctly states that "there is no doubt whatever that making gas by the distillation of coal at low temperatures, and the redistillation of the oil, or oily tar, for the purpose of converting the same into gas, is no new thing; but what the Patent Gas Company say is that it has not been done successfully either in the matter of producing a permanent gas or commercially, except by this method." In my letter which called forth this one of Mr. Mellor's from which I am quoting, I stated that whatever Dr. Eveleigh could do I would do equally well without touching his patent, by methods open to all the world to employ. I repeat it with more emphasis than ever; and when we find these eminent experimenters, whom the Patent Gas Company employed to report upon the Eveleigh process, condemning entirely the second distillation, on the ground that it would be better to sell the oil than to convert it into gas, what becomes of Mr. Mellor's assertion that his company alone had succeeded in distilling coal and oil with commercial benefit?

If the company would only publish the debtor and creditor account of their working at Barnet, we should be somewhat enlightened upon the commercial results. As for the illuminating power of the gas by the time it reaches some of the consumers houses at Barnet, I have been told on very good authority that there are frequent complaints of its bad quality. Poor Mr. Mellor! His report upon the report is that of "a good man struggling against adversity;" for

do what he will he can never make a commercial success out of Dr. Eveleigh's patent method of gas making. That a diminished quantity of gas of a high illuminating power may be obtained by slow distillation we all know, and possibly (but it remains to be proved) it may be advisable, in preference to using cannel *in some special cases*, to have some of the retorts working at low heats for the purpose of bringing up the illuminating power; but I very much question whether it will answer to do so.

To sum up—The patent may be considered to be not worth one farthing excepting to those in the neighbourhood of Throgmorton Street, and I can clearly see that the end will be great gain to the knowing ones, and great losses to those who have more money than brains.

The working of the system is contrary to every commercial principle, as quick returns and small profits are the basis of successful commerce; but with the Eveleigh system it is *slow returns and no profits;* and on this ground alone it must fail to establish itself for any lengthened period.

If Mr. Mellor should favour me with a reply to this letter, I hope he will not again accuse me of "*animus*," as it is facts I have been seeking for, and "out of their own mouths are they condemned." What we want is less plant and more power, not more plant and less power. We want a continuous mechanical system of charging and discharging retorts, entirely different to anything yet produced, which shall be rapid in action, and produce good coke. This is the direction in which inventive genius should work. Dr. Eveleigh's system is altogether retrogressive.

GEO. BOWER.

St. Neots, Hunts, Jan. 21, 1873.

Legal Intelligence.

VICE-CHANCELLOR'S COURT.—MONDAY, JAN. 20.

(*Before Vice-Chancellor* SIR R. MALINS.)

PUDSEY COAL GAS COMPANY *v.* THE MAYOR AND CORPORATION OF BRADFORD.

Mr. GLASSE, Q.C., and Mr. FREELING appeared for the plaintiffs; Mr. COTTON, Q.C., and Mr. CRACKNELL for the defendants.

In this case a bill had been filed to restrain the Corporation of Bradford, who are the owners of the gas-works in that town, from supplying gas within the district defined by the Act of the Pudsey Gas Company. The defendants demurred that the plaintiffs possessed no exclusive right under their Act.

Mr. COTTON, Q.C., said a general demurrer had been put in by the defendants to the bill of the plaintiffs. Although the defendants were the corporation and the borough, yet in fact the bill was between two rival gas companies. The Pudsey Company was a company to sell gas, and they considered that the defendants were opposing them in business. The bill prayed that it should be declared that the defendants were not entitled to supply gas to any street, building, or works not within the Act of the 3rd Geo. IV.; and that they should be restrained from supplying gas to any street or building not within the limit of their Act, and to pay the costs. The corporation acquired the powers of a gas company by an Act in 1871, by which they got compulsory powers to supply gas in the parish of Bradford, and the plaintiffs sought to interfere with the action of the corporation on the footing that they had a monopoly within their own district, but there was no such exclusive power conferred upon them by their Act.

The VICE-CHANCELLOR: Have you express power to go to Pudsey?

Mr. COTTON: No.

The VICE-CHANCELLOR: Have you any authority to go there?

Mr. COTTON said there was nothing to prevent them. If they had gas to spare to supply people living on the verge of the borough, they were at liberty to do so if they could without having recourse to the exercise of compulsory powers. There was no prohibitive clause in the Pudsey Act. London gas companies possessed the prohibitive clauses, but the Pudsey Gas Company had no such power; and although the compulsory powers possessed by the corporation did not extend beyond the limits of the parish, yet there was nothing to prevent them going beyond their parish. Their compulsory powers were simply confined to their limits.

Mr. CRACKNELL followed on the same side.

Mr. GLASSE, Q.C., on behalf of the Pudsey Company, said he claimed no exclusive rights. What he said was this, that a corporation limited by their Act of Parliament cannot go beyond their powers so as to create a private injury; and if a private injury arose, a private individual might file a bill to restrain them. The corporation were entitled within the borough to supply gas, but they were supplying it outside the limits, and the Attorney-General might file an information to restrain the corporation from doing that which the Act empowering them to make gas restrained them from doing.

Mr. FREELING followed on the same side.

Mr. COTTON replied.

The VICE-CHANCELLOR said he should follow the rule laid down in a case of a similar character, in which a Stockport water company was involved, and allow the demurrer.

WATERFORD QUARTER SESSIONS.—THURSDAY, JAN. 9.

(*Before* G. WATERS, *Esq., T.C., Chairman.*)

CONDELL *v.* FITZGERALD.

This was an action brought by Dr. Condell against Mr. Richard Fitzgerald, deputy-collector of lamp-tax, for an alleged illegal distress in the collection of this rate.

Mr. V. PEET and Mr. GIBSON appeared for plaintiff, and Mr. ANDERSON for defendant.

Mr. PEET, in opening the plaintiff's case, observed that it was one in which the public of Waterford took a deep interest, and one which they very much desired to have settled. The prevailing opinion was that this tax was an illegal one, and on that ground its payment was pretty generally refused. Its collection was, however, persisted in, and the present action was brought more for the purpose of having a ruling than for any object of a monetary character. In this instance a sofa, the property of Dr. Condell, was seized by the defendant, who was the deputy of Messrs. Anderson and Jones, the lessees of the gas-works, and sold for £2 14s., on a claim for lamp-tax, which he refused to pay, and that act Dr. Condell complained of as illegal.

Plaintiff swore that he refused to pay the lamp-tax because he believed it to be illegal, and on his doing so defendant seized his sofa, and sold it for £2 14s., the amount of the claim upon him.

On cross-examination by Mr. ANDERSON, *plaintiff* said that the seizure did not put him to any inconvenience.

This was the only evidence for the plaintiff.

Mr. ANDERSON said there was no doubt whatever about the distress having been made, and he referred to the Act under which it was authorized—viz., the 28 & 24 Geo. III., commonly known as the Old Police Act. By that Act vestries, duly assembled in each October, were to ascertain the number of lamps required for each parish, appoint one or more contractors to light the same for one year and not more than three years, and to levy a tax for the proper lighting, trimming, and repairing of such lamps, such contractor to collect the tax, with power to appoint a deputy for the same purpose. The 45th section provided that if the vestries neglected to make such provision for the public lighting, then such powers shall become vested in the corporation. Power of distraint was given by the 40th section to the collector, and the 41st section enacted that a lamp must be within 100 feet of a house to make it liable to pay the rate. The vestry had not acted in this matter of public lighting since 1831, and the duty devolved upon the corporation. In 1867 the corporation accepted a tender from Messrs. Anderson and Jones for lighting the city, the lamp-tax being fixed at 11d. in the pound, and in 1871 that contract was renewed. The defendant was appointed their deputy by Messrs. Anderson and Jones, and the tax had been collected by him ever since. In the course of his duty defendant called on the plaintiff for £2 14s. for lamp-tax for 1869-70, but he declined to pay. Notice was then served on him, but to this document he paid no attention, and the distress was finally made. The resolutions of the corporation approving of the tenders of Messrs. Anderson and Jones, and the warrant appointing Mr. Fitzgerald deputy-collector, were here read by the learned gentleman, who concluded by saying that, in the matter of public lighting, the statute of George III. was left wholly untouched by the Municipal Reform Act.

Mr. *John O'Brien*, town-clerk, gave formal evidence respecting the action of the corporation in the matter of the public lighting, and produced the resolution of the council with reference to their arrangements with the lessees of the gas-works.

Mr. PEET raised several technical objections, which were overruled. In his speech for the defence he also waived the point he had urged, and admitted that in not acting since 1831 there was neglect on the part of the vestries; but he submitted there was no evidence of a contract between the corporation and Messrs. Anderson and Jones. The proposal sent to the corporation purported to be from them, but the bond was entered into by only one of them (Mr. Anderson), and that in itself vitiated anything like a contract. It was contended that the corporation took the place of the vestries; but, even if that were so, the corporation should act in precisely the same manner as the vestries would have been bound to do had they put the Act into operation. The Act required that the signature of the mayor and corporation, or the majority of that body, should be attached to that contract whereas the fact was it only bore the signature of the mayor. In that respect the contract was invalid. The Act said they were to collect the tax half-yearly, but the fact was yearly claims were the rule. The Act further said the tax was for lighting and watching; but not a word was said in the warrant about watching, and there again the document was invalid.

Mr. GIBSON, following on the same side, contended that under the 45th section of the Act the powers of the corporation were limited to one year, and if they made a contract for three years their warrant to collect was bad for two years out of the three. In that view he would submit that the distress here was illegal. In addition it had been suggested to him (Mr. Gibson) by a very ingenious friend of his, that the Irish Church Act had abolished the vestries, and, in doing so, had swept away their powers. If that view were correct the corporation had no power whatever to act in this matter at all, and he thought there was a good deal in the objection.

The CHAIRMAN, in giving his judgment, said on the part of the plaintiff it was contended that there were certain irregularities on the side of the corporation in the carrying out of the Act, and that therefore the distress made could not stand. His expectation had been that the plaintiff's contention would be that the Act of George had become obsolete, and was wholly nugatory for present purposes. It was, however, admitted that, as provided for under that Act, the corporation could take the place of the vestries, and that being so, he had only to consider whether or not the provisions of that Act had been complied with. It was not denied that the city was lighted, and that under a contract which was duly observed; but one party objected to pay the tax leviable under it because the contract was not sealed, and because, whilst Messrs. Anderson and Jones were the parties with whom the contract was made, Mr. Anderson alone was made the collector under the warrant, and because the tax was levied for lighting alone, whereas it should be for lighting and watching. He confessed those objections had not much weight with him in coming to his decision. Since 1831 the corporation had the lighting of the city in their hands; they appointed the contractor and the collector, who performed his duty, and the result was the city was lighted. The Church Act was relied on as abolishing vestries, and therefore, taking away those powers, but he could not agree in that view. Vestries were not abolished; the parishioners still met for certain purposes, and it was as a meeting of parishioners for certain purposes they were contemplated by this Act of Parliament. That being so, those powers exercised by the corporation, originally imposed upon the vestries, had not lapsed, and the right to levy the tax had not been abolished. Another objection was, there was no agreement with a contractor. Even if that were the case, he did not regard the fact as material, because if the city was lighted, even without the existence of a contract, the citizens could not reasonably object to pay for that benefit. The object of the contract was to obtain light for the city, and if the contractor furnished that light it was immaterial to consider whether he was or was not really bound to an agreement; and as to the contract not being under seal, he thought it now too late to argue that point. He was of opinion that the contract agreed to by the corporation, in solemn council assembled, and signed by Messrs. Anderson and Jones, quite comprehensive and sufficient for all purposes. On the whole facts before him he had come to the conclusion that the corporation had as much power as the vestries to make a contract in the specified terms, on which ground he should rule the distress here as good, and dismiss the process.

The process was dismissed accordingly.

LANARKSHIRE SHERIFF COURT.—WEDNESDAY, JAN. 22.

(*Before Mr. Sheriff* DICKSON.)

THE CORPORATION OF GLASGOW *v.* THE PARTICK, HILLHEAD, AND MARYHILL GAS COMPANY.

In this case the Corporation of Glasgow, as owners of the gas-works supplying the city, applied for an interdict against the Partick, Hillhead, and Maryhill Gas Company, Limited, to have them interdicted and prohibited from disconnecting any meter belonging to the petitioners, or from opening up any street where gas-pipes belonging to the petitioners had been laid, or in any way interfering with gas pipes belonging to the petitioners.

The SHERIFF, after hearing the parties, granted an *interim* interdict against the defendants and all persons acting under their instructions from disconnecting any meters belonging to the corporation, and from interfering with any pipes belonging to them.

At the sitting this day the parties were heard as to whether any and, if so, what reservation should be made with a view to enabling the defenders to disconnect the meters in question at the request of the proprietors or occupiers of the premises in which the meters were, in the case of the failure of the corporation to do so, after due notice from the owners or occupiers. In the note attached to the interlocutor, Sheriff Dickson says:—The defenders procurator denied that they have cut, or otherwise injured, any pipes belonging to the pursuers, but admitted that they have, without the pursuers authority, disconnected the meters supplied by the latter to a considerable number of persons, and which meters are admittedly the pursuers property, and were admittedly used for supplying the pursuers gas to the premises where they were at the time of the disconnexion. It was stated that the defenders have thus acted with the authority of the occupants of the premises, and after due notice to the pursuers. The terms of the notices, it was said, had been arranged with the pursuers secretary, and had been dealt with on both sides as equivalent to notices by the occupants of the premises. In support of this statement the defenders procurator produced the blank form of printed notice. It is headed as being from the defenders company to the pursuers, and bears the name of the defenders manager printed at the foot. It is in the following terms:—"No. ——. Notice is hereby given, that we will proceed with the laying

of pipes for the purpose of supplying gas to ——, on ——, at ——, 1872." This form of notice does not state that it is given with the authority or at the request of the owner or occupier of the premises to which it applies; and it contains no indication of any intention on the defenders' part to disconnect or otherwise interfere with the meters in these premises. Admittedly, the defenders have no statutory powers, but are a joint-stock company acting as for their own interests, whereas the pursuers are a public body acting as in the interests of the public in the exercise and performance of statutory duties. The pursuers procurator did not point out any provision either in their private or in any public Act as to the removal of meters in case of the occupants of the premises wishing their supply of gas discontinued, but he showed a memorandum which the pursuers usually print upon the back of their accounts for gas (but apparently without statutory authority), that "no meter should be removed or disconnected except by a servant of the corporation." He admitted, however, that if the corporation officers did not remove or disconnect the meter after reasonable notice from the owner or occupier of the premises, the latter might do so, and might employ the pursuers for the purpose. It was stated for the pursuers that their practice, on receiving an application from the occupier or owner, is to act at once by their own officers to disconnect the meter; and the defenders procurator did not allege that in any instance they had neglected to remove a meter, in consequence of which the defenders had done so. All the removals or disconnexions by the defenders officers had admittedly taken place on their own authority, and without the control of any one representing the pursuers. In these circumstances the sheriff-substitute considers that the defenders have no case *primâ facie* for their admitted interference with the pursuers property, and that such interference must therefore *primâ facie* be regarded as unlawful and a trespass, against the repetition of which the pursuers are entitled to interdict. This remedy is specially necessary, seeing that the meddling with gas-pipes or meters without due precautions not only involves risk of escape of gas—*i.e.*, of waste of the pursuers property, but also danger to life. There is considerable risk from this source in the defenders servants dealing with the pipes and meters in question in a manner unknown to the pursuers, and as to which pursuers cannot be expected to make appropriate arrangements. The interlocutor is not intended to deal with the case of the defenders acting as the agents of the owners or occupiers of premises under a notice from the latter to the pursuers to remove their meters, and of the pursuers failure timeously to do so. Some reservation on this point may be necessary. There are not yet materials to enable the sheriff-substitute to determine as to this. The *interim* interdict has also been granted against the defenders interfering with pipes belonging to the pursuers, because the pursuers procurator stated that that had been done in three specified cases. It has not been granted against the defenders opening up streets, &c., where the pursuers pipes are laid, because if that is done with due care, the pursuers will not suffer damage, and because the pursuers have no rights over the streets and others except in so far as required for the protection of the pipes therein.

FRIDAY, JAN. 24.

This case was again before the sheriff this day, that parties might be heard on the question—Whether the interdict already granted should be modified, so as to allow the respondents, on the authority of consumers, to disconnect meters belonging to the corporation?

Mr. T. G. WRIGHT appeared for the corporation, and Mr. J. B. DILL and Mr. BORLAND for the limited company.

The case was opened by Sheriff DICKSON, who said: The respondents have not shown that the petitioners have failed to remove meters when desired to do so by the consumers. What position is to be taken up?

Mr. WRIGHT: The position I take up as to the meters is this—that neither a consumer nor any one authorized by him is entitled to disconnect or remove the meters of the corporation.

The SHERIFF: Even in the event of your not taking any measure to do so?

Mr. WRIGHT: Even in that event. But I say further that we have never refused, and will not refuse, to disconnect a meter on being requested to do so by the consumer.

Mr. BORLAND: I contend that a meter is a moveable object, and may be removed like any other moveable thing, provided no loss is sustained. A meter is just a moveable object lying on a shelf; and if I wish to get the use of that shelf for any legitimate purpose, I am entitled to remove that meter, provided I give the corporation an opportunity of removing it first, and on their failing to do so, they have no right to insist on their property lying on my shelf, except with my consent, and I am therefore at liberty to remove it myself. The petitioners in this case have prepared a form of notice from the consumers to the petitioners.

The SHERIFF: This notice is not fair. It is addressed to the Glasgow Corporation, and says:—"I have to request that you disconnect your pipes and remove your meters, at ——o'clock, on the —— day of ——." Now, that notice might be given to the corporation five minutes before the hour, when it would be physically impossible for their servants to be there in time.

Mr. BORLAND: My object in naming a time is this. Supposing I were to send a notice to the corporation that I wish pipes disconnected any time within 24 hours, they might send out at once and disconnect their pipes for the purpose of leaving me in darkness.

The SHERIFF: You might send out 150 notices of that kind, and have workmen waiting to disconnect the pipes and remove the meters which the corporation might be unable to attend to owing to the number of notices given, and that would on your part be taking your full pound of flesh.

Mr. BORLAND: Each consumer only sends one notice. But if your lordship will be satisfied with 48 hours notice, I am willing to give that.

Mr. WRIGHT: We are dealing with the respondents, who have committed an unlawful act by interfering with the property of the corporation, and they now propose that you should legislate upon this question. They say that, on becoming agents for the consumers, they should be entitled to do certain things which I maintain the Legislature has not permitted the consumers themselves to do. The meters are the property of the corporation, and are put into the houses or premises of the consumer for the purpose of measuring the consumption of gas. The statute carefully protects these meters against interference, and imposes a penalty upon any one who removes or injures them; and necessarily so, because, unless these meters are preserved intact, there is no other way of measuring the gas. Further than that, the Legislature protects the consumer against the removal of these meters by the corporation, under any circumstances, without due notice. If the corporation intend to cut off the gas because the consumer has failed to pay for what he has already consumed, they must give him 24 hours notice, and the removal of the meter must take place between 9 a.m. and 4 p.m., that the consumer may be protected against the contingency of being left in darkness without notice. In the Gas Act of 1871, which does not apply to the undertaking of the corporation, there is a provision to this effect:—"No consumer shall disconnect any meter from any such pipe, unless he shall have given 24 hours notice in writing of his intention so to do; and if any person acts in contravention of this section, he shall be liable to a penalty not exceeding 40s."

The SHERIFF: That seems to be reasonable.

Mr. WRIGHT: Thus, for the first time, the Legislature gives power to the consumer to remove the meter. That Act is not incorporated with our Act; so that, if the law was such that it required legislative enactment to give the consumer power to disconnect the meter (and we must presume he had then no power, as the Legislature would not now have enacted such a law), it follows that they have no power over our meters.

The SHERIFF: That is merely an assumption. Common law would have provided a period when it was to be done. Common law might have authorized due notice, leaving each judge to decide what due notice was.

Mr. WRIGHT: I think my argument is consistent with the common-law rights of the two parties to the contract under which the meter is placed there. It is placed there by the corporation under the contract with the consumer for a certain purpose. That purpose would be defeated if the consumer were entitled at his own hand to remove it. If he gives notice to the corporation to have it removed, and we refuse, then, I submit, his remedy is to apply for judicial authority to have it taken away. There may be questions which require to be decided between the two before the meter can be removed; and the possibility of deciding such questions may be entirely taken away by the removal of the meter by the consumer himself. Now, what the respondents propose that your lordship should do is this—to set aside this interdict on a consumer's sending us a notice of which they approve, and the due delivery of which they are to judge of; and should we not remove our meters, then they, forsooth, are to have the power of doing so—a power which the consumer himself has not. I submit that it is a proposal as novel as it would be inexpedient and dangerous to give effect to. We have no guarantee that the respondents would even carry out that which they now propose, and, to judge by the past, I do not think much confidence can be placed in what they are likely to do. I submit, as regards the meters, that the interdict must be absolute—that the respondents must be prevented from touching or handling the property of the corporation. I will not refer to the pipes of the corporation at present, unless my friend wishes to discuss that matter.

Mr. BORLAND: It is a question whether this interdict is to apply to the acts of the company when they are done under the instructions of the consumer. I cannot suppose Mr. Wright is serious in maintaining that, simply because meters are once placed in a house, the consumers are bound to keep them there until a warrant from court is got for their removal. The meters may thus have to remain for weeks, months, or years, and the consumers are reduced to the alternative of using and paying for corporation gas, because they dare not cut their pipes or disconnect their meters for the purpose of having our gas introduced. The corporation succeeded two competing companies, who were in the habit of supplying gas to individual consumers, who sometimes changed from one company to the other, and yet they had no difficulties about changing meters after receiving due notice. I therefore submit that the company should not be subject to interdict at the hands of the corporation when they are acting under the consumers instructions, especially after notices such as these signed by the consumers, and sent 24 hours before the hours named, have been received by the corporation. I consider that section 15 of the Gas Act of 1871, which lays down 24 hours notice, to be amply sufficient.

The SHERIFF: You are aware that in that clause meters can be removed in some cases in twelve hours, and in other cases a very severe penalty can be imposed if they are taken away before 24 hours expire. Now there is nothing in this notice referring to exceptional cases. Here is a provision which protects the corporation on the one hand, and on the other hand protects the consumer. To ask me to accept the one-half of it is not dealing at all with the spirit of the statute. Then there is the question which Mr. Wright has brought up about their notice on the back of their accounts. I will not say what may be the exact legal effect of that notice, but it is suggestive at all events of a contract which has been made by the corporation with the consumer. They say we will supply you with gas on these terms, and the consumer agrees to the conditions. Now, supposing that is the case, the consumer does not come here saying I want to enter into a new contract with the corporation; I want to throw off the old contract, and begin a new one under certain conditions. Besides, the consumer is not here. And it has never been shown that the corporation have refused in any one instance to remove their meters when called upon to do so.

Mr. BORLAND: By section 60 of the Corporation Act of 1869 it is provided, "that the corporation can compel the consumers to use meters." Now, I am bound by this clause to accept the corporation meter. There is no contract. I must receive their gas, or I would be left in darkness. This is not a contract in the strict sense of the word. It is only part of an Act of Parliament. Now, this clause also clearly shows that the corporation have no right to have a meter in my premises if I cease to be a consumer.

At the close of the arguments, the SHERIFF gave judgment to the effect that it was not expedient to qualify the interdict in favour of the respondents.

The following statement has been issued by the directors of the Partick, Hillhead, and Maryhill Gas Company, for circulation among the residents in these districts:—"The directors of the Partick, Hillhead, and Maryhill Gas Company, Limited, have had their attention directed to a circular sent by the Corporation of Glasgow to the consumers of gas in Partick, Dowanhill, Hillhead, and Maryhill, and they consider it due to themselve to state that in no single instance, so far as they are aware, have their servants unduly interfered either with the pipes or meters belonging to the corporation. As soon as this company was in a position to supply gas, it became necessary to give notice to the corporation of the names of those consumers who were desirous to substitute the new gas for that supplied by the corporation; and accordingly a form of notice was printed and sent by this company as occasion required. In all cases the corporation received 24 hours notice of the intention to change the supply of gas. With the view of preventing all questions between this company and the corporation, a meeting was arranged between the treasurer of the Corporation Gas and the manager of this company, which took place on the 2nd of January current. At this meeting it was stated, on behalf of this company, that they were most anxious to avoid all questions with the corporation, and so to conduct their operations as not in the slightest degree to interfere with the pipes or other property of the corporation, and that they were prepared to adopt any reasonable suggestion which the corporation had to offer which would tend to secure this result. The printed notice prepared by the manager of this company was discussed, and the only alteration upon it which was suggested by the treasurer of the Corporation Gas was in reference to the date, a suggestion which was at once adopted. At the close of this interview the manager of this company understood that the Corporation Gas Commissioners were quite satisfied, not only with the form of the notice, but with the fact of the notice being sent in the name of this company, and not in the name of the consumer. Notwithstanding this, the corporation, without ever making any complaint to this company, or requesting them to alter the form of notice, on which they had been acting during the whole of this month, by removing the meters of consumers who had changed their gas supply, applied for an interdict, which had been granted to a limited extent, but the only effect of this interdict is to lead to a change in the form of the notice, which in future will be in the name of the consumer. The directors rely upon the good sense and independence of the consumers to aid them in resisting all overbearing attempts, from whatever quarter they may proceed, to interfere with that free choice and liberty to which every member of the community is entitled, to purchase gas, like every other commodity, in the best and cheapest market in which it can be obtained. The directors would remind consumers in the district that the company was originated partly in consequence of the bad quality of the gas supplied by the corporation, and partly in consequence of the differential rate levied, the residents beyond the municipality being charged 2½d., or, making allowance for difference in discounts, 3¼d. per 1000 cubic feet more than the residents within the municipality, and this notwithstanding the fact that the gas supplied by the corporation was manufactured within the district itself—viz., at the gasworks in Partick."

Miscellaneous News.

AIR GASLIGHT COMPANY, LIMITED.

A Meeting of the Shareholders in this Company was held at the London Tavern, on Wednesday last, Jan. 22—Sir JOHN MURRAY, Bart., in the chair.

The CHAIRMAN said the directors had great pleasure in meeting the shareholders, and he was satisfied that, after hearing the report of the directors, and the remarks of the managing director, the meeting would have the same confidence in the undertaking as the directors had always had since the commencement of the company. No doubt, out of the 451 shareholders, there might be one or two who were rather dissatisfied; but it was no wonder if such were the case, because the company had met with very considerable opposition, and a number of comments in letters in the press which were calculated somewhat to damp the spirits both of the directors and of the shareholders. However, he was fully satisfied that, after hearing the explanation of Mr. Lord, the managing director, the shareholders would feel full confidence in the future of the company.

The report was as follows:—

The directors have the pleasure of meeting the shareholders, in compliance with the Act of Parliament, which requires that a statutory meeting shall be held within four months after the date of the incorporation of the company; and, although the period for rendering accounts and statements of the affairs of the company will be at the next general meeting, the directors are happy, nevertheless, to afford information with regard to the past and present position and future prospects of the company. The number of shares allotted was 27,053, to 451 shareholders. It will be in the recollection of the proprietors that, on the eve of allotment, the columns of the press were opened to the correspondence of several inventors, each claiming the patents taken out by Messrs. Harrison and Son as their own particular invention, thereby creating doubts in the minds of applicants for shares and the public, and seriously interrupting negotiations then pending for the sale of foreign patents. The directors publicly announced that they had been properly advised there was no foundation for the alleged infringements, and they regret that the press should, upon the mere statement of individuals, so seriously jeopardize the interests of a large body of shareholders. The attacks thus made upon the company encouraged several persons professing to have patents to threaten proceedings against the company for alleged infringements. The directors are able to state that the professional advice and opinions published by them at the time have been confirmed, and that, with but one exception, no proceedings have been taken beyond idle threats. The case above referred to came on before the Attorney-General on the 26th of November last, and was determined in favour of the validity of the company's patents. The introduction of the company's gas, like all other new inventions, has been met with opposition and difficulties, but the directors are of opinion that Messrs. Harrison have made vast improvements—beyond any which have hitherto been made in illuminating gases; and they confidently believe that the company's operations must prove highly successful, as evidenced by the daily demands made for the company's gas, for all kinds of purposes, from almost every part of the United Kingdom. The directors consider that, before commencing the actual business of the company, it would be more satisfactory, and would place the company in a better position, to treat for the supply of the company's gas, after a practical test had been supplied on a large scale; and, with this view, they have arranged for lighting up the Crystal Palace, which they believe will afford the most public and practical test of its value. The directors had hoped to have succeeded in accomplishing this before the present meeting, but they regret that the works have been delayed by the weather and other causes not under their control. They are, however, confidently assured by Mr. Harrison that in a few days they will be in a position to invite the shareholders to view and judge for themselves. The shareholders are aware that patents obtained by the company include also improvements in the application of air gas to heating purposes, and experiments are now being conducted, in conjunction with a large firm in the smelting trade, which promise to equal, if not surpass, the profit to be derived from the use of gas for illuminating purposes. In the application of the company's patents it will be seen that the consumption of mineral oils, from which the company's gas is produced, will be very largely increased, and the directors are of opinion that, notwithstanding the inexhaustible natural resources, the company should place itself in a more independent position to secure a regular and constant supply. For this purpose it may be desirable hereafter to submit in detail the views of the directors to a meeting of shareholders.

Mr. LORD, having read the report, proceeded to give a summary of events which had occurred since the formation of the company. He said that shortly after the company was announced, letters appeared in the columns of a portion of the press, in which some persons claimed that the company had infringed their own particular patents. This caused a great deal of delay, and tended to seriously jeopardize the interests of the shareholders. However, the result of it all was simply this—that the objections had reference more especially to that patent which was known as Kromschroëder's patent. He had personally an invitation from Mr. Kromschroëder to inspect his works, and he made himself acquainted with that gentleman's process; and he might mention that, in the case subsequently argued, Mr. Kromschroëder not only took no part whatever, but written evidence was before the court that he had not even authorized the proceedings. He believed the case was brought forward by a gentleman who had an interest in the other patent, and when it was argued before the Attorney-General a decision was given against those gentlemen, and in favour of the validity of the company's patent. No doubt the letters which had appeared in the press had a serious effect upon the number of applications for share; and not only that, it had the effect of stopping the negotiations which were going on in connexion with foreign patents, some of which, indeed, had nearly been brought to a conclusion before the company was brought out. These letters also brought down such a shower of correspondence from all parts of the country that it took up the time of a considerably augmented staff to answer that correspondence; because persons interested in the company were alarmed at all the statements put forth, and it was necessary to reply to the letters received, and so put matters before those gentlemen in as clear a manner as could possibly be done. When the alarm had somewhat cooled down, seeing that the company was attacked on several hands, and the derogative statements made—such as that it was not possible to make the gas travel, and that the pipes would become choked, &c.—the directors thought it better to look out for some building where they could show the process at work, and therefore they fixed upon the Crystal Palace, which he thought the shareholders would consider in all respects a first-class place for explaining and testing the company's system. If they could make the gas travel throughout the Crystal Palace, they could certainly make it travel anywhere. He had seen the manager, and arranged that the company's system should be tried, and the understanding was that in the event of this trial proving a success, they would be glad to adopt it, and would bring the matter before the directors of the Crystal Palace. Upon this understanding the directors went to work at the Crystal Palace, and the first thing to be done was to secure a site for a gasholder. The directors had at one time an idea of making a blowing machine to light the building, but, upon further consideration they came to the conclusion that there was nothing like the even water pressure of a gasometer. Therefore the directors looked about to find one; they found several, but they were all honeycombed more or less, and the directors were obliged to reject them. Had they found such a holder as they required, the works would, at the present time, be in a much more advanced condition, and the illuminating power of the process would have been shown long ago. But gasholders were not articles which manufacturers kept in stock, and, therefore, they were obliged to contract for the construction of one, and, as the large iron-works were at present fully employed, they were not anxious to take orders. Then again, owing to the nature of the soil, it was a work of considerable labour to sink a well of some 14 feet deep and 40 feet in diameter, and it was not until the 17th of December that they were able to commence building in the well. To add to their difficulties, no sooner had they set to work than the district surveyor came down upon them, and the works were stopped, and it was necessary to appeal to the Metropolitan Board of Works, who eventually sanctioned the construction of the works. But this was not all; some "wiseacre" spread a report that the well was sunk for the purpose of holding petroleum and mineral oil; and, of course, such a statement considerably alarmed the shareholders of the Palace. That soon brought the insurance companies agents down upon them, and several of the companies sent their surveyors by appointment to the Palace to meet the patentee and himself. The whole process was explained to those gentlemen and, after some time, they were able to satisfy the surveyors that there was less danger in it, as far as explosiveness was concerned, than in coal gas. The surveyors accordingly sent a report, which was considered satisfactory by the Crystal Palace authorities. But, in order to put the matter finally at rest, so far as the explosiveness of this gas was concerned, the insurance offices submitted the gas to Professor Armstrong, of the London Institution. As Professor Armstrong's report had not yet been received, it would not be becoming to say much on the matter; but he might state that in conversation with the Professor he had said that the company's gas was not so explosive as coal gas. There were some other little difficulties with the Crystal Palace with respect to pipes which were put down by coal gas companies; but these were overcome, and now the position of the matter was this—that the works were being pushed on, and he believed that in a night or two a part of the Palace near the north-western gallery would be lighted with 400 burners, which would show this company's gas in opposition to the coal gas, which was being used in close proximity. The gas was also being connected with the stage, where at times as many as 4000 burners were being used at one time, and section by section the process would be extended to the whole of the Palace. Shortly after the company was formed, an offer was received from Rochdale to supply the town with a large quantity of gas, but as the work was only to be undertaken for two months, whilst new works were being constructed, and as the terms were not such as the directors considered were fair and reasonable, they declined the offer. During the time the Japanese Ministers were here, they with their engineer visited the works in London several times, and were much delighted with the process; and, as there was a large supply of mineral oil in Japan, he had no doubt that, before long, the company's process would be extensively used there. Messrs. Stevenson, of Edinburgh, who were engineers to the Board of Northern Lights, and also to the Japanese Government, had been instructed by that Government to report upon the company's gas. He (Mr. Lord) explained the process to Messrs. Stevenson, who requested to be supplied with mineral oils and certain other things, in order to test the process. The oils would be placed in Messrs. Stevenson's hands for investigation, and when the investigation was finished negotiations would be opened. The company had been inundated with orders for large buildings, but the directors had not accepted all these orders, inasmuch as in the first place it was absolutely necessary to ensure a regular and proper supply of the mineral oils. The directors were only holding back until they had made such arrangements as would enable them to assure the public that they would get a constant and steady supply. To put at rest the question as to whether the gas could be made to travel, the directors had made arrangements with the Darenth Vale Coal Gas-Works for the illumination of buildings extending over a run of three and a-half miles of pipes, some arrangements had also been made with regard to smelting, which had been successful, and he had no doubt that this department of their business would be extremely valuable. An eminent gas engineer was trying the company's process at his own house, and the result would no doubt be satisfactory. Mr. Harrison, the patentee, had received £55,000 out of the £100,000 which was to be paid to him. He had already invested £40,000 of that money in the purchase of shares, and there was a liability from that gentleman of about £30,000 more on the shares held by him. This was about the best proof that could be given of Mr. Harrison's confidence in the undertaking.

Mr. DOLMAN inquired whether any payment had been made by the company to Mr. Kromschroëder, also whether the company had made any arrangements for the occupation of premises in which to store mineral oils; whether any terms had been agreed upon with the Crystal Palace or the parties at Rochdale, and the conditions upon which the Darenth Vale works were to be taken. He asked also with respect to the £30,000 liability by the patentee to the company—of what did it consist?

Mr. LORD said no payment whatever had been made to Mr. Kromschroëder. The directors were in negotiation with persons largely interested in the mineral oil trade, in order to arrange for the storeage of that article, but it would not be judicious to go into that matter. No terms had been agreed upon with the Crystal Palace; they would be conditional upon success. At Rochdale the price offered the company was too small. It was not to the interest of the company to state more than that the terms at Darenth Vale were favourable. With regard to the £30,000 liability from Mr. Harrison, he explained that of the £100,000 payable to that gentleman, £70,000 had been invested by him in shares of the company, and the £30,000 due from him was regarded simply in respect to calls of £2 per share upon his shares.

Mr. HARRISON having offered a few observations on the probable future success of the company,

Mr. DOLMAN asked why the company was not quoted on the Stock Exchange.

Mr. LORD said it was simply because the company's prospectus did not quite meet with the requirements of a new rule of the Stock Exchange which had not been published at the time the prospectus was issued. As soon as there were more dealings in the shares, there would be no difficulty in obtaining a quotation.

Mr. HAND raised several objections to the management of the company, and moved a resolution that the present meeting be adjourned for a month, in order that the success of the experiment at the Crystal Palace might be determined. On the assurance, however, by the chairman, that if the experiment were not a success the shareholders should be called together, the resolution was withdrawn.

A vote of thanks to the directors closed the proceedings.

PROPOSED CONSTANT WATER SUPPLY IN LONDON.—The regulations for the constant supply of water submitted by the water companies of the metropolis, and approved by the Board of Trade, formed the subject of discussion at the last meeting of the Lambeth Vestry, and a resolution was agreed to affirming "that the regulations made for the constant supply of water are not only oppressive, but vexatious and conflicting, as against owners and consumers, in relation to the prescribed fittings required under the Metropolis Water Act, and that in relation to constant supply it appears difficult whether the same can be obtained without considerable difficulty and enormous expense being incurred. Legislation on this important subject is difficult and ambiguous, and the interests of the owners or consumers have been overborne and sacrificed to the powerfully vested interests of the water companies within the metropolitan area." At the last meeting of the Shoreditch Vestry the Sanitary Committee reported that having considered the Board of Trade regulations, they had come to the conclusion "that the regulations are unnecessarily expensive, and totally inapplicable to the class of houses for the benefit of whose inhabitants they were intended." The Mile End Vestry have also unanimously adopted the following resolution:—"That notwithstanding the advantages which may be expected to arise from a constant supply of water in this district, the regulations adopted by the Board of Trade are so unsatisfactory, and would lead to such an enormous expense, and be a source of such annoyance to consumers, that the vestry hope the Metropolitan Board will resist them, even to refusing a constant supply of water on such vexatious conditions." The Whitechapel District Board of Works have resolved "that to comply with the regulations with regard to the fittings for a constant supply of water as a retrospective measure will entail costs so excessive as to become oppressive." The local boards of Limehouse, St. George's-in-the-East, and the East of London generally have passed similar resolutions.

METROPOLIS GAS SUPPLY.

Kensal New Town.

On Tuesday evening, Jan. 14, a public meeting was held in the Club Room of the Prince Arthur Tavern, Golborne Road, "to protest against the intended rise in the price of gas, and to consider the desirability of forming an association for the protection of gas consumers." Mr. Marlis (churchwarden of the parish) occupied the chair.

The Chairman said the object of the meeting was to protest against a monopoly imposed on the district by the gas companies. The present price of gas was 5s. per 1000 feet, but the company had given notice of an intention to raise the price to 5s. 5d. In the City of London and in other parts of the metropolis it was only 3s. 9d. per 1000 feet. If the inhabitants of the City could obtain good gas at this price, he saw no reason why the people at the West-end should pay 5s. 5d.

Mr. T. Steadman suggested that the gas companies should be petitioned, and if the ratepayers could not get redress, the aid of the Metropolitan Board of Works and of Parliament should be invoked to protect the consumers from the monopoly and extortion of the companies.

Mr. Carter said in one part of the metropolis gas was supplied at 3s. 2d. per 1000 feet, and in the City at 3s. 9d., and yet the inhabitants of Kensington were compelled to pay 5s., with the prospect of 5d. increase. If gas could be obtained at 3s. 2d. and 3s. 9d. in some parts of London, there must either be very great loss or very great profit somewhere.

A resolution was then moved that the meeting should memorialize the gas company to ask them as soon as possible to supply the district with gas of the illuminating power of 16 candles at the same price as that supplied to the City of London—viz., 3s. 9d. per 1000 feet.

The Chairman thought it would be of no use appealing to the gas company. He suggested that the meeting should co-operate with the Kensington Vestry in the application to the Board of Works and the Board of Trade.

Mr. Davey pointed out that if on the south side of the Thames the price was 3s. for 16-candle gas, 24-candle gas would only amount to 4s. 6d. per 1000 feet; but the company wanted to charge 5s. 5d. The ratepayers would not mind what they paid, provided the profits on the manufacture belonged to the parish, and went in the reduction of rates. He suggested that application should be made to the Home Secretary for power to acquire the property of the gas companies, paying a fair price, in order that the ratepayers might make their own gas. The Home Secretary was the only person who had power to interfere.

After considerable discussion the amendment was withdrawn, and a committee appointed to draw up a memorial to the Home Secretary, praying that gas might be supplied at the same price as to other districts.

Kensington Vestry.

At the Meeting of this Vestry, on Wednesday, Jan. 15—Mr. Saunders in the chair,

Mr. Gilbert inquired of the medical officer of health the illuminating power of the gas supplied at the present time.

Dr. Dudfield said 23½ candles.

In reply to Mr. Snell, Dr. Dudfield further said that the minimum occurred on the 4th inst., when it was 22·38 candles. That evening (Wednesday) it was 24.

Subsequently a discussion took place with reference to the price of the gas, and the question was referred to the Works Committee.

It was also stated by the medical officer that the illuminating power of the gas for 1872 averaged 21·64 candles, somewhat below 1871, when it was 21·96 candles.

Vestry of St. Martin's-in-the-Fields.

At the Meeting of this Vestry on Thursday, Jan. 16, the Gas Committee appointed in April last to confer with representatives invited from other vestries and local boards upon the subject of the supply of gas to the metropolis made their report. It appears that twelve of the local boards responded to the invitation, and among the parishes represented were Shoreditch, Southwark, Bermondsey, Kensington, Paddington, Mile End, Strand, and Wandsworth. Since April last the committee have had ten sittings. The report stated that previous to the Act of 1868 the whole of the gas companies of the metropolis were under the same regulations, but that measure only affected the three companies now amalgamated and known as The Gaslight and Coke Company, and secured to the consumers a maximum price of 3s. 9d. per 1000 cubic feet of 16-candle gas, a provision for the further reduction of the price if it could be shown that the companies could supply gas at a lower price, the abolition of the reserve-fund, and the establishment of an insurance-fund in its stead, the appointment of gas referees and examiners to test the gas on behalf of the consumers, and the audit of the accounts by a public auditor. The select committee who examined the bill were unwilling at the time to apply the more stringent regulations to other companies, but in 1869, upon the Imperial and South Metropolitan Companies seeking additional powers, they were placed under similar restrictions, and the new capital of the Imperial Company of nearly £1,000,000 was not allowed to bear a higher dividend than 7 per cent. The three companies just named supply about half the metropolis; the remainder are subject to the more favourable provisions of the Act of 1860. It appeared to the conference that the Act of 1868 should be extended, and they recommended a series of resolutions, copies of which will be sent to all the local boards of the metropolis for approval, to the following effect:—The maximum price of gas (except cannel gas) to be 3s. 6d. per 1000 cubic feet, with an illuminating power of 16 candles, with a provision for reduction should the circumstances of the company admit of it. The maximum price of cannel gas to be proportionate to the price of ordinary gas, and not less than 20 candles. Referees to be appointed by the Board of Trade, and testing officers by the Metropolitan Board. All vestries and district boards to be compelled to appoint gas examiners and adopt the meter system, and be at liberty to provide, light, and maintain public lamps, and not be required to provide more than one meter for every 20 lamps for testing the average consumption, the vestries now paying an annual charge per lamp, the companies to be liable for default. The committee remind the vestries that by the Act of last session The Gaslight and Coke Company can raise capital to bear a dividend of 10 per cent.; the same company has given notice of application to Parliament for powers to invest capital in mines, ships, and railway plant; and that the Imperial Company seek powers to amalgamate with any other company, "binding," say the committee, "as to dividend and capital, and shutting out the ratepayers from all future remedy." The report was adopted, and the clerk instructed to send copies to the various local boards of the metropolis.

Metropolitan Board of Works.

At the Meeting of the Board on Friday, Jan. 17—Col. Hogg, M.P., in the chair,

Mr. Freeman introduced a numerous deputation from the vestry of Kensington, and three public meetings held in the parish, to present a memorial on the subject of the proposed increase in the price of gas supplied by the Western Gaslight Company. In the memorial the board were requested during the present month to go to the Board of Trade for a revision of the scale of price and illuminating power of gas, with the intent that commissioners be appointed under the Acts of 1868.

Mr. Gibbons, in support of the memorial, said: You are probably all aware that up to the month of December last year the parish of Kensington was supplied with gas by the Western Gas Company. About that time an amalgamation took place with The Gaslight and Coke Company, under the Gas Act of 1868. Under the powers of that Act, The Gaslight and Coke Company took over the Western Company, and a notice has been served on every gas consumer, intimating that the gas hitherto supplied at 5s. per 1000 feet will be increased to 5s. 5d., and the illuminating power to 23 candles. That excited a great deal of dissatisfaction, and meetings have been held in consequence. On looking at the Act, I find that the only parties who have power to interfere in the matter are, as regards the City, the corporation, and outside the City this board is the only authority to whom we have to look to protect our interests. We believe the gas may be produced at a very much less cost than 5s. 5d. We know that, previous to this, it was supplied at 5s. 6d., and that, in consequence of a representation from the vestry of Kensington, the Western Company reduced their price 6d. per 1000 feet. Although they did that, they divided a dividend of £11 18s. 6d. per cent.; and if they did that and supplied gas at 5s. per 1000 feet, it seems to me The Gaslight and Coke Company may pay 10 per cent. and supply us with gas at 5s. per 1000 feet. We find that at Caterham, where gas is supplied by the local authority for the use of the asylum, it can be supplied at 1s. 6d. per 1000 feet—that is, exclusive of labour. The coal is supplied under very disadvantageous circumstances as to carriage, &c., but the labour is free, and the gas is supplied, sufficient for all purposes, at 1s. 6d. per 1000 feet.

Mr. Richardson: Is that cannel gas?

Mr. Gibbons: No, common gas. There is a general opinion that the one is equal to the other. Although the Government have provided tests, the tests do not always agree. We find that although the Government inspector invariably reports the gas as above the standard, it appears by our own test below the standard, and we find the burners generally used, upon the representation of the Western Gas Company, do not give sufficient illuminating power. We find the ordinary burner supplied by the gas-fitters is not suited to the consumption of cannel gas. The whole thing is so unsatisfactory as regards the public generally and the local authorities, that it seems to us imperative there should be an inquiry in the matter, and it is by means of this board only the inquiry can be had under the Act of 1868. You can require of the Board of Trade an inquiry by commissioners. The time has now arrived when this board should be called upon to render some assistance, and we trust you will take such measures to protect our interests as you may deem proper. As to the increase of price, the whole parish is unanimous in asking for such protection as this board can give us, and we trust, when the board considers the matter, they will be of opinion that there should be an inquiry on the subject. I may also mention that I have been requested to call the attention of the board to the circumstance that there are bills before Parliament that require very careful watching, in order that the public may not be placed at a greater disadvantage than at present.

Deputy H. L. Taylor: Do we understand that we have power to require the Board of Trade to appoint commissioners?

Mr. Gibbons: Quite so.

Deputy Taylor: You told us the Western Gas Company supplied you with gas at 5s. 6d., and of their own free will reduced it to 5s.

Mr. Gibbons said that reduction was obtained by putting on a little pressure—by negotiation.

Deputy Taylor inquired if there was anything in the increased cost of labour and coal that required an increase in the price from 5s. to 5s. 5d.

Mr. Gibbons: We think not. There has been a corresponding increase in the price of all the products of gas, in the price of coke, &c., and with the light that science has thrown upon manufacture we think we should have a much cheaper gas.

Mr. Freeman moved that the memorial be referred to the Works and General Purposes Committee for consideration and report. He said that the memorialists felt aggrieved not only at the price of gas, but at the necessity of taking cannel gas without appeal, unless that board granted them some relief.

Mr. Dresser Rogers seconded the proposition, and, in doing so, called attention to the several sections of the Act of Parliament under which power was given to the Metropolitan Board to interfere in the matter, and said he felt desirous of informing the deputation that under the provisions of those sections it might be a question whether any immediate relief could result, as, in the first place, the application had to be made in January, and, in the second place, the commissioners appointed had only power to go into the question of price, trammelled by certain stipulations in the Act of Parliament relative to the payment of dividends of 10 per cent. and other matters; and he thought that the inhabitants should mainly devote their attention to obtaining, if possible, ordinary coal gas, the same as supplied to the other portions of the metropolis, in contradistinction to cannel gas, because cannel gas was very nearly double the price of ordinary coal gas, and although nominally of much greater illuminating power, yet with the burners ordinarily used by consumers it did not give out so much light as the ordinary Newcastle coal gas, the burners used in the majority of shops not being adapted to the consumption of cannel coal gas. He felt sure that in the hands of their able representative, Mr. Freeman, their interests would be so protected before the committee that the subject would receive ample consideration. He was glad to find the consumers of gas in the parish of Kensington at last waking up with regard to the question of gas supply, when it began forcibly to touch their own pockets.

Mr. Richardson remarked that local authorities and private individuals could manufacture gas for their own use, but were not at liberty to sell a foot of it.

Mr. Watson said he thought this matter was referred last week to the Works and General Purposes Committee. He would urge upon the committee the necessity of immediately taking the subject into consideration, for the various vestries had received notice from the gas companies to terminate their contracts, and, therefore, it affected not only the ratepayers of Kensington but of the whole metropolis.

The motion was then carried, and the memorial was referred to the Works Committee.

Chelsea District Board.

At the Meeting of the Board, on Tuesday, Jan. 21—Mr. Livingston in the chair—a letter was read from the London Gaslight Company, stating that from Lady Day next the price for gas supplied by them to the public lamps will be at the rate of 3s. 9d. per 1000 cubic feet, the quantity consumed yearly being 22,000 cubic feet per lamp; and that such price, together with the cost of keeping in repair, cleaning, lighting, &c., will form the annual charge.

The Clerk said the present price was £4 10s. per lamp per annum, and the new price would be an addition of 7s. 6d. per lamp per annum. Two years ago Dr. Barclay computed the annual consumption at 21,400 cubic feet.

The committee decided to recommend the vestry to write to the company, asking for a further explanation of the proposed increase in the price of gas, and also calling their attention to the difference between their estimate of gas supplied to each lamp per annum and Dr. Barclay's.

A letter was read from the Chartered Gas Company, offering to supply gas to the public lamps at Kensal New Town at the following rates:—3 cubic feet of gas per hour, £4 5s. 5d. per lamp per annum; or 2½ cubic feet per hour, £3 14s. 4d., including in each case repairs, lighting, cleansing, &c.

The committee resolved to recommend the vestry to adopt the latter terms.

CITY COURT OF SEWERS.

GUILDHALL, TUESDAY, JAN. 21.

At the Meeting of the Commissioners this day—Mr. BEDFORD in the chair—a report was presented by Mr. Liddle and Dr. Tidy (acting in the absence of Dr. Letheby) in reference to the apparatus which the New River Company require to be fitted in water-closets with a view to the prevention of waste:—

Gentlemen,—In accordance with your request, we have the honour to report to you respecting the water supply to the closets of the houses situated in Red Lion Court, Cannon Street.

Close up to the ceiling of every closet throughout the building there is placed a small cistern or "service box," filled with water from one large cistern on the top room of the house. Each of these small cisterns is provided with a waste-pipe to prevent any possible overflowing of the water, and is trapped so as to cut off all communication with the supply cistern other than that required for the delivery of water. This arrangement forms the "waste-preventer," "so constructed as not to be capable of discharging more than two gallons of water at each flush" (sec. 21).

We examined two of the closets carefully. In one a considerable quantity of water flowed into the pan upon putting up the valve, and continued to flow even after the valve was let down until the small cistern appeared to be entirely emptied. This being the case, we found it was impossible to get any more water for some time, or until the "service box" had completely refilled itself. In the next closet we examined, although the "service box" was quite two-thirds full of water, we were unable to obtain more than about a pint of water at each time of raising the valve, a quantity which, in our opinion, is insufficient.

We were not conscious of any unpleasant odour whatever arising from these closets.

Without giving any opinion of the waste-preventers in these closets, or of the method adopted, in accordance with the regulations under the Metropolis Water Act, we consider that the apparatus in the two closets referred to was exceedingly imperfect, needing both attention and repair to render it efficient.

Dr. TIDY added that he had seen the apparatus at Mr. Hawksley's house and it worked admirably. It had this advantage, that it cut off the communication between the closet and the supply cistern.

Mr. KNIGHT agreed with the doctor that they ought to separate the closet from the water supply, but that could not be done satisfactorily with this tinkering little system. If they were to have another cistern, it must contain ten or twelve gallons. He thought the proper course for the commission was to send a copy of this report to the Common Council; it would then be referred to the Gas and Water Committee, and be properly gone into. He wanted to prevent the waste of water as much as any one, but there was a great deal of trash spoken on the subject. They ought not to be subjected to this sanitary nuisance, and to the consequent danger of bad smells and flooding.

Mr. J. E. SAUNDERS said, when these "service boxes" were used, as they would not keep in repair it was necessary to have a plumber in almost every day to attend to them; in addition to that the drains would not be flushed, and the only good that would be got was the keeping of the closet separate from the drinking water. In new buildings the water companies required constant pressure pipes to be put in, but they did not give a constant supply; they were putting the consumers to much expense without giving them anything in return. On the contrary, there was the drawback of stinking houses, and the danger of being deluged with water. The subject was under discussion at the committee of the Metropolitan Board of Works on Monday, and it appeared that the companies were giving notice of a constant supply in parts of certain districts. The board considered whether they should not treat them in their own way, and give notice immediately under the statute that they should give a constant supply to every part of the district. The result would be that they could not do it, and they would be at the feet of the board in an instant. He hoped they would soon come to the conclusion that they had been wasting a great deal of time over the water question, as they had done over the gas question, and that they would say these were things that public bodies representing the ratepayers must have in their own hands. Why should consumers be put to great inconvenience, and be doubly rated for something they had not got? If the supply of water was a profitable matter, they might be able to separate the drinking water from the water required for flushing, and have a balance for other purposes. He hoped the corporation and the Metropolitan Board would take up the subject, and express a clear and distinct opinion; and if the Legislature did not see fit to deal with it at once, he hoped they would reiterate their opinion until they got the matter into their own hands.

After some remarks from Mr. HORA, Mr. F. COX, and Mr. RICHARDS, the further consideration of the subject was adjourned for a month on the motion of Mr. R. COX.

KENT WATER-WORKS COMPANY.—At the meeting of the Metropolitan Board of Works last Friday it was stated that this company had given notice of their intention, on and after the 1st of June next, of giving a constant supply of water in such parts of the parishes of St. Mary, Rotherhithe; St. Paul, Deptford; and St. Nicholas, Deptford, as are bounded on the north and east by the river Thames, on the west by the Surrey Commercial Docks and Canal, and on the south by Evelyn Street and Princes Street, Deptford, and by the Foreign Cattle Market.—Referred to Works Committee.

HUDDERSFIELD (CORPORATION) GAS SUPPLY.

The usual Monthly Meeting of the Huddersfield Town Council was held on Wednesday, Jan. 15—Alderman BROOKE, in the absence of the Mayor through indisposition, presiding. The principal question for discussion was a proposed increase in the price of gas.

Alderman CROWTHER moved the following resolution:—"That at the recommendation of the Gas Committee the price of gas be increased from 3s. 2d. to 3s. 6d. per 1000 cubic feet; that the scale of discounts be altered to 2½ per cent. for accounts of £5 and under £30, to 5 per cent. for accounts of £30 and under £55, to 7½ per cent. for accounts of £55 and under £80, and to 10 per cent. for accounts of £80 and upwards; and the price of gas supplied to public lamps be raised to 35s. per lamp per annum." He supposed that every gentleman present would quite agree with the former part of the resolution, that the price of gas be increased from 3s. 2d. to 3s. 6d. per 1000 cubic feet, for he believed that any one at all acquainted with the excessive price of coal at the present time would feel quite sure that the proposed advance of 4d. was small enough. They could not, in fact, possibly do with less. With respect to the discount, however, perhaps some of the large consumers might object to the alteration in discount being lowered from 25 per cent. to 10 per cent., for that was to the largest consumers an addition not only of 4d. per 1000 cubic feet, but an additional 5d., making a total deduction to large consumers of from 25 per cent. discount to 9 3-10ths. He, however, as a large consumer, felt that it would be an injustice to the ratepayers at the present high price of coals to allow the full discount of 25 per cent. He believed it would be allowing too much, though it was not the pleasantest thing in the world for any one like himself, a large consumer, to advocate this. Yet, if it was right—and he felt it was—they were bound to do so. There were many items in the expenses of the gas-works, which were considerably less to a large than to a small consumer. For instance, the collection of accounts and the taking of the observations of gas. Then, with regard to the latter part of the resolution—viz., that the price of gas supplied to public lamps be increased to 35s. per lamp per year—it was well known that that represented a rise of 5s. 3d. per annum. At all events the gas would be supplied to the public lamps at its cost price, and therefore he thought the public had no occasion to find fault.

Alderman LISTER seconded the motion.

Mr. ASTON said he found no fault with the resolution so far as raising the price of gas went, believing it a necessity in face of the increased price of coals, but he did take objection to the discount. He did not see why they should stand at £5, as he thought that the poor man or woman who consumed 10s. worth of gas in the year was as much entitled to the discount as any rich man. If a man burned £5 worth of gas he received 2s. 6d. discount, but if he only burned £4 19s. worth he actually would have to pay 2s. 6d. more than the man who burned £5 worth. Now his (Mr. Aston's) experience on the committee had proved to him, and he thought those gentlemen with whom he had had the honour to act would bear him out, that they had generally the largest number of small accounts out, and though that was the case the committee did not give those people any reason to pay their bills earlier. He believed if the committee allowed 2½ per cent. as a uniform rate they would get the bills in sooner. There was as much right in a penny as there was in a pound, and he therefore thought the corporation ought to allow discount on smaller as well as on larger amounts. As long as they had proved to their cost that, so far as gas profits were concerned, they would, he was afraid, be *nil*, they ought not to give money out of the ratepayers pockets to large consumers. He moved as an amendment that a uniform rate of 2½ per cent. discount on the consumption of gas be allowed to consumers.

Mr. J. A. HOPKINSON seconded the amendment. He said the motion resolved itself into this: people would have an inducement to blow gas away to lessen their account. On the whole, he said, large consumers of gas were not the most profitable to the corporation, and therefore were not deserving of the extra discount. It had been shown that the greatest portion of the profit accruing from the manufacture and sale of gas arose from those who used it regularly rather than from those who required the corporation to put down larger mains, larger works, and have an extremely heavy outlay, and then only use the gas at certain times of the year. The large profits thus received were received from shopkeepers, residents, and other parties who used the gas all the year round, and not from those who were obliged to close their places of business at half-past five, but from those who consumed it later on every night all the year round. It was such parties as those he had referred to who made gas-works pay. Small consumers were equally deserving of discount as large ones. There was one thing with regard to the lamps he wished to say, and it was this. It was common in Huddersfield to send men up ladders to light the lamps, but in other places the men went round with their Davy lamps. In the latter towns men started just immediately at dusk, and in a few minutes the whole place was lighted up, whereas in Huddersfield the men were lighting up a much longer time.

Mr. MARRIOTT perfectly agreed with the remarks which fell from Councillor Aston, but he was almost going to move an amendment himself. He was not going to object to the advance in the price of gas to 3s. 6d., but to contend that it was not enough, and that the committee ought to go much further. He fully concurred in the question of discount; in fact, when the gas was the property of the gas company, the company had a perfect right to give it away if it liked, but it was not so with the corporation. They had no right to give any of it away. To make this sliding scale appeared to him very much like making one law for the rich and another for the poor. He found on referring to the latest accounts, that the receipts over the expenditure for gas during the past half year were £2955. Out of that, if it were a company concern, they would pay a dividend; if it was a corporation they would have to pay the interest on the capital. It happened the half year he was now taking that the corporation had only to pay four months interest out of six months receipts, which amounted to £2000. That left a balance of £955, but that could hardly be said to be profit, for if they had had to pay for six months interest there would have been a little loss. But there was another item which they ought to take into consideration for this next half year, and that was the sinking-fund. For that they must put aside 2 per cent., or £1500. Had they had that during the half year he was speaking about, it would have made a loss of actually £1600. That was supposing the one half year to be like the other. Now let them get from the past half year what was the actual cost of their gas. From a calculation he had had drawn out specially, he found that 73 million feet of gas had passed through the meters. If that, with what was burned at fairs and markets, were turned into measure, 82 million feet of gas had been sold and paid for. Allowing for certain deductions on profits, that was at the rate 2s. per 1000 feet for the first half year. That did not explain the increased price of labour, nor the increase in the price of coal. The increase in the price of coal for the present half year was 8s. per ton. For a ton of coal they sold 8000 feet of gas, so that it was equal to 1s. per 1000 feet.

The CHAIRMAN that is the advance on the last half year.

Mr. MARRIOTT said: In the half year he was speaking about they had not had the advance in the price of coal to its present rate to contend with. They had advanced in the make or sale of gas about 10 per cent. every year, so that in this present half year the corporation would make or sell 90 million feet. To make that amount of gas it would require 11,500 tons of coal, and that, at the advance of 8s. a ton, gave £4600. That was just one item they would have to meet next year different from the last. How were they going to meet it? Ninety million feet of gas at an increase of some £2250. The coke, calculated at an increase of about 10 per cent., came to £985; increase from ammoniacal liquor, £400; and the reduction of that would be about £300. That would make a total of £3915, as against an extra cost of £4600. That deficiency it would be seen was on the coal alone. On the first half year he had shown them there would be a loss, so that on the present half year there must be a very considerable loss. In fact the interest on the capital for the half year was £3000, the sinking-fund would be about £1500, and the depreciation would amount to £350, thus making a total of £4850. If they divided 90 million feet of gas into that £4850, they would find it came to 1s. per 1000 feet in the first half year; then gas cost 2s. per 1000 feet and the excess price in coal cost 1s., though they would have to deduct from that 4d., the price derived from the coke, leaving it at 8d.; they would require to pay for the sinking-fund 1s., thus bringing it altogether up to 3s. 8d. per 1000 feet of gas. Now there were other increases to add, such as labour and several other things, which made him quite certain that to sell their gas even at 3s. 8d. and not allow a fraction of discount, would land them in a considerable loss. He would allow discount to bring people in with prompt payments, but the price of gas should be fixed at such a rate that the corporation could really allow it. He would like to move that the council confirm the price at 3s. 6d., but that it be referred back to the committee if they considered at the next meeting it wanted revising.

Mr. HOUGHTON said he thought it would hardly be right to let the matter pass without making one or two remarks. He was perfectly satisfied of the truth of Mr. Marriott's remarks, and he was convinced that the gas would be a debtor to the corporation. Indeed they had never yet made out any figures that 3s. 6d. per 1000 feet would cover the expenses of making, &c. He thought he might safely tell the council there was not one of them could bring forward figures that would justify that statement. He was quite convinced that if they did not raise the price of gas still more, it would prove a debtor. He knew that people had been thinking that coals would soon come down in price, but would any gentleman, he asked, be justified in conducting his own business on any calculation of that sort? If Mr. Marriott moved that the price of gas be 3s. 8d. per 1000 feet, he should be glad to second it.

Alderman DENHAM said when the property of the gas company was bought, it was bought in a hurry, and they as a council had neither the full figures nor the details before them, nor even any fair or full calculation, but they relied on the statements of the company. They showed that they could then afford to supply to the public lamps at the rate of 22½ per 1000, which came to about 29s. 9d. per lamp per year. He had asked for the quality of the gas, but had not got an answer, though it was a most important question. He was sure with the present price of coal and wages the corporation could not afford to

sell it for less than 3s. 6d., and he was equally sure that for the last twelve months the gas consumers had been having it at 4d., if not 5d. less than cost price. He was prepared to support the resolution that the price be raised to 3s. 6d., with a strong conviction that the committee ought to investigate the whole case to see if they could afford to sell it at that price.

Alderman VARLEY supported the amendment of Councillor Aston, but was of opinion that the matter ought to be definitely determined before being recommended by the committee.

The CHAIRMAN said, as a member of the Gas Committee, he felt bound to say that there was some difference of opinion as to what discount ought to be allowed.

Alderman CROWTHER replied. They all agreed that the 4d. was little enough, and the truth was that the committee could not do with less. If, however, they were making an error in fixing the rise too low, that could be altered at some future meeting as soon as they had taken the scale, and if it did not pay they would have to advance it higher at some future time. With regard to the amendment of Councillor Aston, he was quite willing to adopt it if he would consent that the discounts be allowed on any sum however small. With regard to Councillor Marriott, he wished to say that it was not they who had allowed those things he referred to. The corporation bought the works when such and such was the rule, and it was understood that they would follow out a similar principle to what had been followed out before.

The amendment was then put to the meeting, and carried by 26 to 10.

Mr. MARRIOTT then proposed that the price of gas be 3s. 8d. per 1000 feet, remarking that if there was any loss on the gas account, it would have to come out of the borough fund.

Mr. HOUGHTON seconded the motion.

Mr. KENWORTHY remarked that Mr. Marriott's figures might be right or wrong, but so long as the Gas Committee had not sufficient time to make a calculation, it would be well for that committee to reconsider the statements of Mr. Marriott, and bring the whole question before the council again. He thought the council ought to pass on without saying anything further on the matter.

The amendment was then put to the meeting, and lost by a large majority; whereupon Mr. Aston's amendment was put as a substantive motion, and carried by a large majority.

CHELSEA WATER-WORKS COMPANY.

The proposal of this company to obtain parliamentary powers in the next session of Parliament to take land skirting the Surrey side of the Thames from Bayle Farm, the residence of Lord St. Leonards, to the river Mole, near Hampton Court Bridge, has given rise to great opposition. A large meeting was held at the National Schools, Thames Ditton, on Saturday, Jan. 11—Mr. MONEY WIGRAM in the chair.

The Hon. F. SUGDEN proposed the first resolution. He said he was sure they would all have been pleased had his father, Lord St. Leonards, been able to come and represent the matter with his old force and clearness. He was expressing Lord St. Leonards' idea in saying he believed they had a strong case against the company, whose intentions, if carried out, would greatly injure the neighbourhood. The position they took up in opposing the company's proposals was that they had no wish to hinder any quarter of London from receiving a pure supply of water from the Thames, but they were decidedly against land by the side of the river being taken, and a wall being built all along the bank for a mile. The wall was to be 22 feet high, and the beauty of the whole of that picturesque part of the Thames would be destroyed. The company proposed to take their water from the Thames above Moulsey Lock; why, then, should they bring it all the way to Ditton, and keep it till they wanted it at Surbiton, especially when it was not at all necessary that they should have their reservoirs near the Thames? Sir Richard Baggallay, M.P., wished to be present, but, as he had another engagement, had written to say that he most sincerely agreed in the opposition. The speaker concluded by moving the following resolutions:—

That this meeting condemns the proposed works so far as relate to the river-wall and the formation of reservoirs, for the following among other reasons:—That, if carried out, the works will seriously affect the poorer and working classes of the district, whose support is dependent upon the visitors attracted hither for the purposes of boating and fishing; that the raising a wall 22 feet high the entire length of the river frontage from the Ember at East Moulsey to a point near the Swan Hotel, in Thames Ditton, and the formation of reservoirs covering an area of 40 acres upon the adjoining meadows, will injuriously affect the health of the population, and that, as a consequence, the loss of occupation and health will compel many of those now maintaining themselves and their families to seek an asylum in the workhouse, and thereby greatly increase the burdens of the ratepayers. That, being a place of neither commerce nor manufacture, and sought chiefly by residents and visitors on account of its rural and picturesque scenery, Thames Ditton and the neighbourhood will suffer greater injury and depreciation in value by the proposed works than would most other places, and for which no compensation is or can be provided. That the lands taken by the company under their Act of 1852, and now in their possession and unused, should be first rendered available for the purposes of the company before they be authorized to take any other valuable lands, to the great injury and disfigurement of the river Thames. That if additional lands be needed for the purposes of the company the same can be obtained in other quarters where the proposed works would effect much less damage to both public and private rights and property. That it is contrary to good policy that the public should be damnified for the mere convenience or profit of a company of shareholders.

Mr. MATTHEWS seconded the resolution, and it was carried unanimously.

Mr. C. J. CORBETT, of Ember Court, in moving the following resolution, said they could not get on without pecuniary assistance, and offered to head the subscription list with £50:—

That for the purpose of opposing in Parliament the proposed works of the company, so far as relate to the river-wall and the formation of reservoirs, the following noblemen and gentlemen be requested to act as a committee, with power to add to their number:—Lord St. Leonards, Mr. Hannibal Speer (lord of the manor), Mr. W. W. Fitzwilliam Dick, M.P., General Herbert, C.B., Mr. Edward Raphael, General Lambert, Captain Rowley Lambert, R.N., Mr. Sandys, Colonel Freemantle, General Smyth, the Rev. E. H. Rogers, the Honourable and Rev. F. Sugden, Mr. H. C. Watson, Colonel Terry, and Mr. Money Wigram.

Mr. WALTER, representing Mr. Palford, a landowner, whose interests were affected, seconded the resolution, and condemned the conduct of the company.

The MAYOR of KINGSTON (Mr. Thomas Clements) stated that he intended to bring the question before the Corporation of Kingston, and if they thought fit a public meeting would be called, to which inhabitants of the whole neighbourhood would be invited. The second resolution was then carried unanimously, as also were the following:—

That petitions against the proposed works be prepared for presentation to both Houses of Parliament, and that the members for the county be communicated with and requested to present such petitions, and to offer their most strenuous opposition to the company's bill when before the House. That his worship the Mayor of Kingston-upon-Thames be waited upon and invited to convene one or more meetings for the purpose of considering the said works and adopting measures for opposing the same in Parliament. That the nobility, gentry, and inhabitants of Hampton Court and of East and West Moulsey, and of all towns, villages, and places interested in retaining and preserving the attractions of the river Thames for the use and enjoyment of the public, be urged to convene meetings and concert measures for opposing the company's bill or bills in Parliament; that the several members for every town and county through or near to which the river Thames flows be communicated with and requested to oppose the company's bill in Parliament. That a subscription list be opened towards defraying the expenses of opposing the scheme of the company in Parliament, and that Mr. C. J. Corbett act as treasurer.

The Hon. F. SUGDEN stated that petitions in opposition would be presented by Lord St. Leonards and Mr. Speer.

The meeting closed with a vote of thanks to the chairman.

LINCOLN GAS SUPPLY.

OPPOSITION TO THE BILL OF THE GAS COMPANY.

A Special Meeting of the Lincoln Town Council was held on Saturday, the 18th inst., the Mayor presiding, for the purpose of receiving a report of the Corporation Parliamentary Bill Committee upon a bill proposed to be laid before Parliament in the ensuing session, intituled "A Bill to enable the Lincoln Gas-light and Coke Company to execute new works," &c. The report presented by the committee, was as follows:—

"The committee recommend that the proposed gas bill be opposed—1. On the ground that the proposal to declare the capital of £8000 henceforth to be £80,000 is preposterous; the original outlay of £8000 and the sums (as we understand) since spent on the works which do not exceed £35,000, making the whole cost £43,000 only. The sum of £35,000 having been taken out of profits, and in fact paid by the public, represents profits in addition to the monstrous dividend of £40 per cent. upon the capital, which the shareholders have of late received. 2. The proposition for future dividends to be limited to £10 per cent., amounting to £100 per cent. on the paid-up capital, is also untenable, because the result of it would be to make the original shares of £25 equal to £500 at £5 per cent. 3. That the extension of the works to Boultham, Bracebridge, Canwick, and Skellingthorpe is inexpedient, because we believe the dividends from such outlay would have in effect to be paid by the Lincoln consumers, as such outlay would not be remunerative. 4. That the maximum price of gas proposed is excessive, and ought not to be allowed; the present price charged for gas was amply remunerative, considering the present price of coal. 5. That the price of gas to be supplied to consumers on the South Common shall be the same as in the other parts of the city. 6. That the new shares shall be sold by public auction for public competition. 7. In consideration of the large consumption of gas by the public lamps, it is desirable that a discount should be allowed to the local board, and to all other consumers of upwards of 100,000 feet per annum, in proportion to the amount of their consumption."

Mr. CLARKE, in moving the adoption of the report, said: I think it is highly probable that at least £10,000 of the company's money has been spent upon perishable appliances for the production of gas, which sum ought to have been written off the profits as ordinary working expenses. It is a well-known fact that all our large manufacturing firms write from 10 to 15 per cent. off their profits every year for depreciation in the value of their machinery, plant, &c., and for the replacement of the same. Our gas company do not appear to have got so far in their arithmetical calculations as subtraction, but seem well content to stop at addition. The gas company will probably tell you that an eminent engineer values their works at £80,000. That may be perfectly true, but men's opinions differ as much as their faces, and I have no doubt that we shall be able to produce engineers of equal eminence who will declare that the works are not worth more than £40,000. In clause 26 the gas company fix the maximum price of gas at 4s. 6d. per 1000 cubic feet as long as coal remains at 16s. per ton or under. Now I think the gas company in asking so much admit too much, for they go on to say that in case coal shall exceed 16s. per ton they must add one-eighth part of such excess to the 4s. 6d.; for instance, supposing coal advances to 20s. per ton, the gas company would be entitled to an additional 6d. per 1000 for the gas. If for a consumption of 4s. worth of coal they can supply us for 6d. how on earth can they reconcile their charge of 4s. 6d. for the remaining 16s. worth of coal, which at the same rate should be 2s. One ton of good coal will produce 10,000 cubic feet of gas, and after the gas is distilled there remains a residue of 68 per cent. of coke and 12 per cent. of tar, besides other products. If you take off the cost of coal and labour, you will find with gas at 3s. 4d. per 1000 cubic feet there is a very handsome margin left for dividends. In the town of Beverley the corporation own the gas-works, and they are now charging 2s. 11d. per 1000 feet for gas, with a discount of from 2½ to 20 per cent. to consumers, in proportion to their consumption, and then out of the profits they are enabled to pave and repair the town streets. If gas can be supplied at 2s. 11d. per 1000 feet in Beverley, and leave a handsome profit to the corporation, surely 3s. 4d. per 1000 should be sufficient in Lincoln. The Leeds gas companies applied on five separate occasions for additional powers, and in each instance the corporation was successful in compelling them to accept a maximum dividend of 6 per cent. Our gas company are not even satisfied with 40 per cent. on their original capital, but have the boldness and audacity to ask for 100 per cent. I think it is the duty of each individual member of this corporation to use his very utmost endeavours to prevent such bill from becoming law.

Mr. DOUGHTY seconded the adoption of the report, without pledging himself to all its clauses, though he quite agreed with its spirit and tone. It was well known that he held strong opinions about the whole of these public companies—that they should be vested in the town, which would be for the interest of the citizens, and not adverse to that of the shareholders. With regard to this company, if they had it they would be one great co-operative store, and the profit would be divided amongst the citizens. He did not believe it was right to undervalue the property of any one, whether public or private, and in regard to the water-works he might say that they all desired to give the full value. Happily that matter was now settled. He thought that they had a grievance to deal with in this bill, and had a right to oppose it, as it asked for powers which would affect the ratepayers; and when they considered that the company was a monopoly—for they were compelled to go to it for gas—they must look at the bill in a way different to ordinary articles of consumption.

Mr. W. B. MALTBY thought that it was a matter of indifference as to what the company valued their works at, and the corporation had no right to say they should not capitalize their property or divide their shares as they proposed. He knew it might be said that if they were permitted to do that it was not for the interests of the town, and his own opinion was that they should protect the town against any greater price being charged for gas; but that object would be best attained by inserting in the bill a clause fixing the maximum price at what was now being charged. They might even go further, and stipulate for a reduction of price in the event of coal becoming cheaper. As to preventing the company extending their works to the surrounding villages, that was totally uncalled for, because the interests of the town would not be jeopardized thereby, as the company would not be likely to propose such a thing if they did not believe it would be remunerative; and it was only reasonable to consider what might be the needs of those places 20 or 30 years hence, having in view the rapid increase in the population of the city. He thought they might also ask for a clause giving them the power of purchasing the works. He supported the proposal that the bill be opposed, though there was much in the recommendations of the committee he did not approve of. He would therefore move—"That the council is of opinion that the maximum price of gas proposed by the new bill is excessive, and that it ought not to exceed the present price."

Mr. J. MALTBY thought it would be much better if they were to meet in committee and then discuss the various clauses of the report *seriatim*.

Mr. WILLIAMS said he would move the adoption of the first two lines of the report, viz.—"That the bill be opposed," leaving the discussion to a future meeting.

Mr. T. MALTBY seconded this.

Mr. RUSTON said that they had only that morning to consider certain *primâ facie* matters and then to decide whether it was wise to go on with the opposition. He was quite willing to refer the matter to a committee of the whole council, for he was not aware that there was any desire to force on the whole of the report, and there might be other points which it would be deemed wise to consider. He had not entered into this subject with a view to factious opposition, but if nothing more were done it was at least very desirable that a committee should watch the progress of the bill, in order that all interests might be duly considered. The company was certainly asking for powers which the committee thought they ought not to ask for. What proof could they give that their works were worth £80,000? and as to proposing to supply the villages, that appeared to be merely a sop so as to enable them to get the other things they wanted. If they got

their capital declared to be worth £80,000, and went for 10 per cent. dividends on that amount, it would require a considerable rise in the price of gas to earn that dividend; but if their works were put at £50,000, then possibly they might be able to pay 10 per cent. and yet reduce the price.

Mr. C. BEARD (a shareholder): I believe we shall be limited to 7 per cent.

The TOWN-CLERK: You ask for 10 per cent. on the old, and limit the £20,000 new capital to 7 per cent.

Mr. RUMBLE remarked that an increase in the price from 3s. 4d. to 4s. 6d. would make a difference of £304 per annum in the public lamps.

After some further remarks on matters of detail, the amendment that the bill be opposed, and that the report be referred to a committee of the whole council, was put, when all present voted for it except Messrs. C. and W. Beard, shareholders, who voted against the opposition. This terminated the meeting.

A meeting of the shareholders in the gas company took place in the board-room on Monday, the 17th inst., when it was unanimously resolved to prosecute the bill of which notice has been given. Mr. Tuckwood was in the chair.

PROPOSED SALE OF THE ALLIANCE AND DUBLIN CONSUMERS GAS COMPANY'S WORKS TO THE CORPORATION.

MEETING OF THE CHAMBER OF COMMERCE.

A Special Meeting of the Members of the Dublin Chamber of Commerce was held on Saturday, Jan. 18, for the purpose of considering a letter from the corporation, requesting the chamber to appoint ten citizens "to act with the Gas Committee already appointed by the Municipal Council as a joint committee for the thorough investigation of the gas question, with power to obtain the assistance of such eminent engineers, accountants, and others as they may select for investigating the estimates and all the details necessary to a thorough understanding of the question." The chair was taken by the president, Mr. JAMES DIGGES LA TOUCHE.

The SECRETARY (Mr. Bagot) having read the notice convening the meeting, as also the communication from the corporation,

The CHAIRMAN said he had been directed by the council of the chamber to state to that meeting that a letter had been received from the corporation requesting the appointment of ten gentlemen representing the chamber to confer with the committee of the corporation on the subject of the gas question. The council were of opinion that the matter was one which should be discussed and decided by the entire chamber, and that it would be, on their part, an excess of the powers which had been entrusted to them to enter upon the topic independently of the chamber. They had, therefore, convened the present meeting of the general body. At the same time he wished to state that he was directed to express the sense of the council in regard to the subject to be considered. In a matter of such importance as the gas question, greatly affecting as it did the interests of the citizens at large, and particularly of the mercantile community, the council had arrived at the conclusion that it would be wise to acquiesce in the proposition of the corporation. The present meeting was not assembled to decide the merits of the gas question, or to criticize any clauses in the Act of Parliament which it was in contemplation to introduce in connexion with it. They were simply met to decide whether they should or should not give a favourable response to the invitation of the municipal body, and, in case they should, to appoint ten gentlemen to carry out the purpose of the invitation. On these points he was authorized to express the willingness of the council either to make the appointment themselves or to leave the selection in the hands of the meeting. To save time and trouble the council submitted ten names for the approval of the meeting, suggesting at the same time that should these gentlemen be appointed, they should be requested to report individually the results at which they had arrived with respect to the gas question, as well as to contribute to the joint report to be furnished collectively by the representatives of the chamber. The chairman then formally put it to the meeting whether it was of opinion that a favourable response should be given to the invitation of the corporation to depute ten citizens representing the chamber to confer with the municipal committee on the gas question.

The expression of opinion was unanimously in the affirmative.

The CHAIRMAN submitted the following gentlemen for the approval of the chamber, as having been nominated by the council:—The president, the hon. secretary (Mr. Bagot), Messrs. James C. Colville, Robert Geoghegan, Ralph Cusack, John Wardle, J. E. Barry, J. Williamson (Todd, Burns, and Co.), R. Woods Kelly (Cope Street), Samuel Boyd (Mary Street).

Mr. PEILE asked whether any of these gentlemen were holders of shares in the gas company.

The CHAIRMAN said he believed not.

Mr. ROONEY was proceeding to speak of the taxation of the citizens in the matter of gas, and the extent of public ignorance which prevailed on the subject of the gas question, when he was called to order by a member, who submitted that he was travelling outside the proper topic of discussion.

Mr. ROONEY maintained that he was in order.

The CHAIRMAN said he would be in order in inquiring whether any of the gentlemen named held gas shares, but he was not entitled to enter into the merits of the question. As regarded the inquiry of Mr. Peile, he (the chairman) could only answer for himself. He held no shares.

The HON. SECRETARY: And I can answer for another.

Mr. STEENSON (secretary to the gas company) said, as a matter of fact, none of the gentlemen named held shares in the company.

The gentlemen named were unanimously elected to "form a committee to unite with the committee of the corporation to investigate all the accounts and other matters pertaining to the gas question."

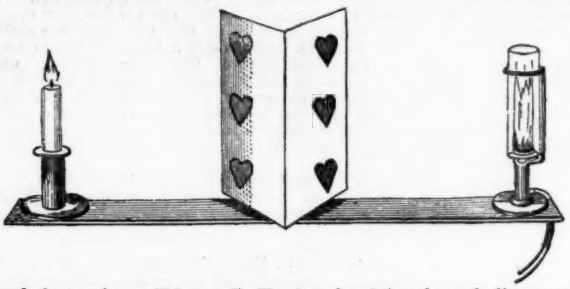
Mr. BAGOT (hon. secretary) said the merchants and members of the council would be justified in ensuring for themselves a *locus standi* to oppose the bill in Parliament, and they would have until April or May to propose a petition to be presented on the subject, if necessary.

The meeting then separated.

CONVICTIONS FOR EXTINGUISHING PUBLIC LAMPS IN DUBLIN.—At the Southern Divisional Police Court, on the 11st inst., before Mr. Barton, two young men, of gentlemanly exterior, named J. Quinn, of 5, Grantham Street, described as a solicitor, and Edward Holland, of 15, Lower Baggot Street, returned upon the charge-sheet as a gentleman, were placed in the dock in custody of police-constable 136 B, charged with having on Friday, the 17th, between eleven and twelve o'clock, extinguished several of the public lamps. The accused were not professionally represented. The constable deposed that on Friday night, between the hours mentioned, he was on duty at Fitzwilliam Square; he saw the prisoners (identified) walking at a smart pace along one side of the square; when they approached a gas-lamp, one of them would put up his stick and turn out the lamp by raising the small portion of framed glass which is under the jet. Witness followed them, and saw that they continued this practice; Holland extinguished five lamps and Quinn three. They extinguished three in Fitzwilliam Square West, one in Upper Pembroke Street, two in Hatch Street, and two at Earlsfort Terrace. The accused Quinn said in defence that this was his first offence, and at the time of the occurrence he was under the influence of liquor. The other accused did not make any statement. His worship strongly commented upon the misconduct of the prisoners. The offence was selfish amusement, and could only gratify the accused for the time. As far as in him lay he would certainly put a stop to such a practice. They should each pay a fine of £4—£1 for each gas-lamp—or go to gaol for two months. The fines were immediately paid.

A SIMPLE PHOTOMETER.

M. P. Yvon has sent to the Paris Academy of Sciences a description of a new and simple photometer, which, for the better information of our readers, is represented in an engraving below. The inventor takes a card, an address or a playing card, folds it in two, so that the two faces are perpendicular one to the other, and places the angle thus formed on a table or bar as below. One of the faces is to be exposed to the light to be examined, and the other to a second light, with which the first is to be compared. If one light is stronger than the other, the one face of the card will receive more illumination, and the angle formed by the card will be seen in high relief. But if the two lights are



equal, the two faces will be equally illuminated, and then the angle disappears, and the card is seen as a plane surface. In making an experiment, it is sufficient to bring one of the lights nearer and nearer to one of the faces until the appearance of relief vanishes; then by measuring the respective distances of the two sources of light from the corresponding faces of the card, the relative intensity may be calculated. It is best to look at the angle through a short tube, or through the hand partially closed so as to form a tube.

The experiment is easily made on a table with a lamp and a candle, or two candles, when the accuracy of the author's description will be readily perceived.

APPARATUS FOR CHARGING AND DISCHARGING GAS-RETORTS.

The apparatus described below, and illustrated on the opposite page, is the invention of Messrs. Somerville and Robinson, of the Alliance and Dublin Consumers Gas Company, and is now in operation at the works of that company, Great Brunswick Street, Dublin. It was patented on the 9th of December, 1871 (No. 3335), and a brief summary of the specification was given in the JOURNAL for Oct. 22, 1872 (vol. xxi., p. 894). It is one of the inventions for which the "Steam Stoker Company, Limited," have entered into preliminary arrangements to purchase.

The invention has for its object the construction of machinery or apparatus whereby the manual labour now employed in the retort-houses of gas-works may be greatly reduced, and consists in laying along the floor of the retort-house grooved rails or trams whereon a platform supported by flanged wheels may run. Upon the platform, and by preference on one side thereof, is fixed a steam boiler and engine, which propels it, and gives motion to the various parts of the machine. On the other side is constructed a substantial upright quadrilateral frame, the corners of which serve as supports and guides for a sort of cradle or secondary platform, upon which rest the scoop or scoops for filling the retorts, or rake for discharging them. On the top of the frame, above the scoop, a receptacle which is supplied with coals from another receptacle below, by means of an elevator of peculiar construction, is furnished with an archimedian screw or other equivalent contrivance, by which the scoop is filled with coals.

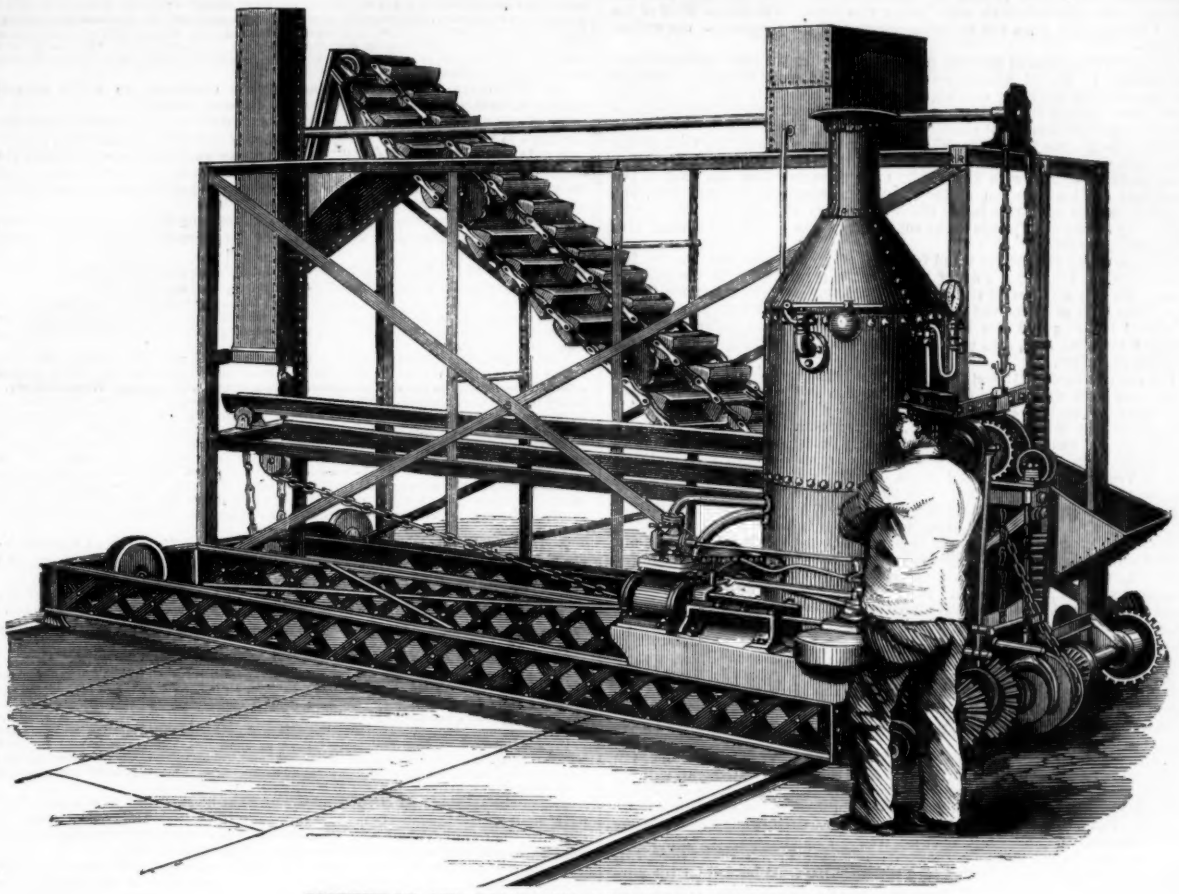
When the apparatus is to be brought into action it is driven along until the scoop stands opposite the retort to be charged; motion is then communicated from the engine to the cradle, which is raised to the height of the retort, and there supported by palls resting on lugs, brackets, or other suitable device attached to the uprights at each corner of the frame. While the scoop or scoops are being driven into the retort they are at the same time being filled with coal or other material from a vertical sliding shoot supplied by the archimedian screw from the top receptacle, or by means of the elevator from the bottom receptacle, the scoop or scoops being driven forward into the retort by means of the engine acting upon a common chain through the intervention of a differential pulley on the main shaft, and other pullies fixed to the carrier-cradle. The scoop or scoops are now turned over by the action of a volute spring upon an upright shaft operating upon two bevel wheels. The motion is then reversed, by which means the scoop (or scoops) is withdrawn, and, being provided with a scraper, is caused to press against the retort in its passage outwards, thereby removing the carbon, or some portion of it, should any have accumulated. Two small scoops may be used instead of one large one, the advantage of which is that the coal is more evenly spread on the surface of the retort, or an archimedian screw working in the scoop may be used to deposit the coal in the retort.

The hoe or rake is attached to the cradle in a similar manner to that of the scoop, and is propelled and withdrawn in the same way. The rake bar is, however, made U-shaped, in order to admit of a bar sliding within the hollow, so as to raise or depress the blade. The U shape of the bar is also taken advantage of to allow a stream of water to run down it, and thus prevent the overheating and bending of the same. The rake is, moreover, provided with a volute or other spring, which, while it keeps the rake in contact with the coke, furnishes sufficient elasticity to obviate any damage which might arise from the jamming of the coke in the retort when being withdrawn.

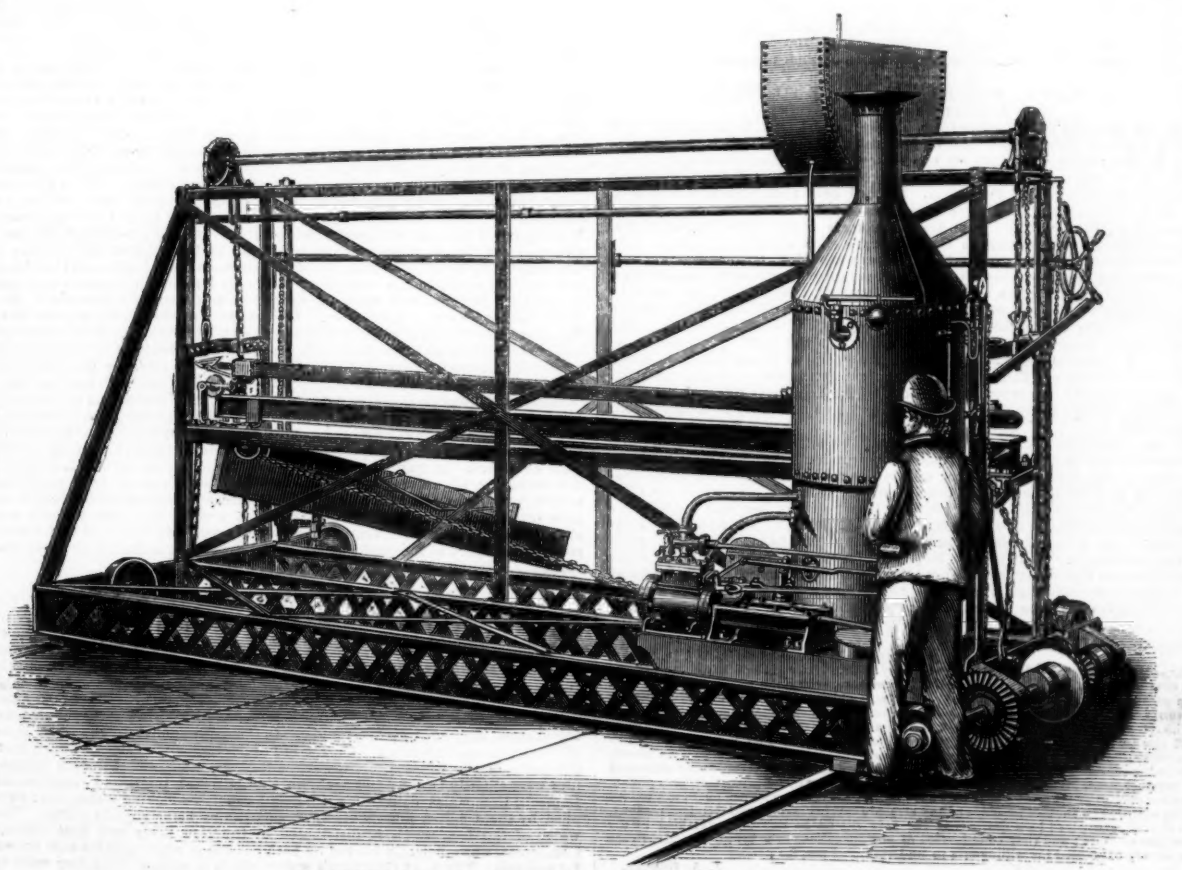
For the purpose of removing the carbon from the interior of the retort the apparatus is so constructed as to allow of a scurfing-bar, fitted with suitable points, being attached to it in the place of the rake, the said bar being provided with a tubular spring. This spring, which is filled with water in order to maintain its elasticity, is used to press the bar against the retort during the operation of scurfing. Another method of removing the carbon consists in forming a hollow bar (so that it may be supplied with water or steam), with a hollow boss or head, having cutters fixed to it, and small holes pierced in it for the emission of small jets of water or steam, to impinge upon the points of the cutters. The bar thus arranged is made to revolve rapidly against the sides of the retort, whereupon the carbon becomes speedily detached without injury to the retort itself. The machine is also furnished with a shoot and connexions into which the hot coke drawn from the retort may be delivered to the furnace for heating the retorts, or into waggons or barrows placed to receive it. This is accomplished by constructing the furnace door of a peculiar shape, and attaching to the machine a kind of shoot specially designed for this purpose.

The whole of the foregoing may be combined in one apparatus, but it is preferred, where circumstances will admit, to have two separate machines, one for charging, and another for discharging and scurfing, each machine being provided with its own boiler and engine.

Manual labour or any other suitable motive power may be substituted for steam in working the machinery.



SOMERVILLE AND ROBINSON'S RETORT-CHARGING APPARATUS.



SOMERVILLE AND ROBINSON'S RETORT-DRAWING APPARATUS.

GAS LIGHTING IN JAPAN.

Gas-works have been erected at Yokohama, and it is expected that the lighting of the city will take place about this time. The *Japan Mail* of the 23rd of October last gives the following account of the progress of the undertaking:—

"It will be remembered that the plant necessary for the manufacture of gas was imported in the ill-fated steamship *Sadkia*, and since the 1st of July the men have been at work day and night in order to be able to supply gas to the native town during the present month. That object will be achieved, for though, despite the strenuous exertions of all concerned, it will be impossible to supply gas in time for the inauguration of the railway and the visit of the Mikado, ten days later will see Basha-Michi, Benten-Dore, and one or two other streets, properly lighted with gas. It is to be regretted that the visit of the Mikado and the inauguration of the gas-works cannot be simultaneous; but the sinking of the main-pipe in the bed of the creek opposite the railway will take so long a time as to preclude the supplying of gas before the 20th or 21st of the current month.

"The gas-works themselves stand in a plot of ground 300 feet long by 200 feet in depth, on the other side of the creek, but parallel with the railway station. On this area are all the necessary buildings, which consist of a distillation house built of stone and brick, and roofed with corrugated iron, a tile and plaster building 108 feet long by 33 feet wide, various godowns for the storing of material, coal, &c., workshops, forge, and a dwelling-house for the European engineers.

"The retort-house is 112 feet long by 32 feet broad, and contains two benches of furnaces, each comprising four furnaces, with five retorts to each. These are in two rows, each on either side of the chimney with which they communicate; are built of brick made in Yeddo, and are some 12 feet high, being of a most substantial character. We need here only describe one, since each is an exact counterpart of the others. The furnace is, as we have said, of brick, made in Yeddo by Japanese, and above are five clay retorts imported from Glasgow, 10 feet in depth, and with iron mouths closed by screw flanges.

"Such are the principal features of the gas-works, and after a careful inspection it cannot be denied that every arrangement is thoroughly satisfactory, and does Mr. Pelegrin, the engineer in charge—to whom we must tender our thanks for the information he courteously favoured us with—every credit.

"We may now pass outside the works, and briefly examine the operations of the company in the public streets. The gas is supplied by a Japanese company, and, as a matter of course, the native town is to be illuminated first. The main-pipe, which is 18 inches in diameter, runs from the works across the creek on a raised bridge, then parallel to the railway station to the creek, which it crosses below the bed, and thence to the Basha-Michi, Honcho-Dore, and up the main street to the police-station. So far has already been laid, but before Christmas it is intended to lay a main-pipe up the main street as for No. 79, thence to the Homura Road and across the creek to the Bluff, while the other streets will be supplied by small pipes, as also will the suburbs of the native town.

"There are, according to the present arrangements, to be 267 public lamps in the native town, without the suburbs, and 135 in the foreign settlement, without the Bluff, the use of one furnace and five retorts only being sufficient to supply the consumption at the outset. The arrangements for lighting the native towns are complete. The public lamps will cost 4 dols. a month each, while the consumers will be charged 3·50 dols. per 1000 cubic feet. We understand that the prices will be the same in the foreign settlement; but nothing has been yet settled, though a preliminary committee of six gentlemen has been formed for the purpose of bringing the matter fully before the public. The company is willing to carry the supply-pipes through the streets before Christmas, and it is to be hoped that something will be done to ensure our having gas as soon after that as possible.

"In conclusion, we can only repeat what we have said before—that the works are in every respect satisfactory. When everything is complete the expense will be only about 105,000 dols., and, considering the great expense of importing the apparatus, this cannot be considered extravagant. The rates charged to consumers will doubtless prove fairly remunerative, and the company will reap its reward in the almost universal consumption of their manufacture."

NATIONAL CONGRESS OF TRADE SOCIETIES.

The London Gas Stokers Strike.

At the Meeting of Delegates from Trades Unions, held in Leeds the week before last, the President (Mr. W. Lishman), in his opening address, referring to the recent strike among gas stokers, said he condemned that strike, however, as inopportune and badly managed, and calculated to injure trades unionism in the minds of the public. He had held that opinion with regard to other strikes; and, if strikes were not conducted intelligently and dispassionately, they would injure trade unionists rather than benefit them. With all true trade unionists, he thought that strikes should be the last resort of trade disputes, and not the first. All means should be tried before proceeding to a strike, and especially with such an organized body as the gas-stokers, who had only newly come into existence, and who, as a body, had peculiar arrangements with their employer. Where the conduct of the men affected the public in the way their conduct had, it might be depended upon that the public would take a one-sided view of the question; and, if the difficulty was not regulated in a becoming manner, and intelligently, odium would fall upon those who had caused the difficulty. But while that strike had been characterized by a great want of judgment, the sentence of Justice Brett was excessive and vindictive. (Several members of the congress expressed their dissent from these views.)

It was stated by Mr. Cremer, at one of the sittings, that, in answer to a memorial from one of the trade societies, founded upon a speech made at Reading by Mr. Lefevre, a member of the Government, as to what were combinations and conspiracies, Mr. Gladstone had sent a reply, which he (Mr. Cremer) would read. Mr. Lefevre had said that during last year the Government had paid £50,000 more for coals for the Royal Navy, owing to the extraordinary high prices, the main cause of which he said had been a combination of the coalowners. That was the language of a Minister of the Crown, and the Amalgamated Carpenters and Joiners therefore memorialized Mr. Gladstone as to whether the Government was prepared to put the law in motion against those conspirators (the coalowners), and whether it would appoint a commission to inquire into the causes of the present high prices of coals. Mr. Gladstone's reply was as follows:—

10, *Downing Street, Whitehall, Jan.* 10, 1873.

Sir,—Mr. Gladstone has directed me, in reply to your letter of the 6th inst., to express his conviction that his colleagues agree with him in regarding the present prices of coal as a great evil; but he is not aware of any facts which would warrant Her Majesty's Government in assuming that individuals have in any manner made themselves obnoxious to the law in connexion with this subject. Should such facts be produced they will meet with immediate attention. In the absence of these, though he does not say no circumstances could justify an inquiry, he is not convinced that it would be for the public advantage in the present situation of the question. In regard to the gas stokers lately sentenced to imprisonment, Mr. Gladstone has no doubt that you will perceive that an opinion, whether correct or otherwise, that they have received a severe sentence ought not to lead to the adoption in another province of any measure not justified by independent reasons, but should rather lead to a desire that the case should be carefully examined by the Secretary of State; and that examination of any allegations laid before him Mr. Bruce has already expressed his willingness to undertake.—I am, &c.,

J. A. Godley.

At a subsequent period of the meeting Mr. Cremer moved the following resolution:—

That this congress, being of opinion that the present high prices of coal and iron are due to a combination of coalowners, ironmasters, and capitalists, and that such combination is a conspiracy of a graver and much more serious character than the so-called gas stokers conspiracy, instructs the parliamentary committee to institute proceedings in a court of law against either coalowners or ironmasters, with a view of ascertaining whether the laws of combination and conspiracy are so framed as to apply to all who combine and conspire, or whether they have been enacted especially to crush combination on the part of working men.

Mr. M'Donald, Manchester, seconded the resolution, to which several members, including the chairman, expressed strong dissent.

Mr. Kane moved—"That this congress considers such a proposition as Mr. Cremer's to be unworthy of the consideration of any body of intelligent men."

Mr. Allan seconded this, and Mr. Halliday supported it, saying that the original resolution would initiate principles destructive of their interests; and he was not quite sure that by adopting it they would not be coming within the meaning of "conspiracy against the masters."

Mr. Cremer declined to withdraw his resolution, but Mr. Kane withdrew his. On a vote being taken, only three voted for Mr. Cremer's motion; and it was therefore decidedly defeated.

In the case of the London gas stokers the following memorial to the Secretary of State, praying for a remission of the sentence, was agreed to:—

We, the undersigned, beg most respectfully to lay before you, as the representative of the Government of the Home Department, this memorial, praying for a mitigation of the sentence passed by Mr. Justice Brett on the London gas stokers, at the Old Bailey, on Thursday, Dec. 19.

Your memorialists humbly submit that these men did not intentionally, and with malice aforethought, violate the law; but this congress, without wishing at this time to question the legality of the verdict, express astonishment and profound regret that men, acting in what they conceived to be their *bonâ fide* right, should be so severely sentenced. If there was a necessity to vindicate the law of contract, the punishment which the men had already endured was more than ample for the offence committed. The deep feeling and painful surprise at the severity of the sentence felt in all parts of the country, as well as a sense of justice and humanity, leads this congress, representing 700,000 men in Great Britain and Ireland, as detailed in the list appended hereto, to pray for the release of the prisoners now under sentence of twelve months imprisonment in Maidstone Goal. We therefore pray that you would advise Her Majesty's Government to advise the exercise of Her Royal clemency to release these poor men without delay.

A meeting was held at the Lambeth Baths on the 21st inst. to receive the reply of the Home Secretary, at which Mr. Murphy officiated as chairman, and the following resolution, moved by a man named Hunter, and "carried unanimously," is recorded for the sake of exhibiting the folly and meanness of the men who have taken the lead in this movement, and not for the purpose of reflecting on the audience, who can hardly be supposed to know what they were holding up their hands in favour of.

That this meeting of working men of South London, having heard the reply of the Home Secretary to our memorial of the 27th of December, hereby respectfully but firmly deprecate the delay which is taking place upon the subject, seeing, as they think they do, in the reticence, very great deference to the feelings of a Tory judge, and very little to those of the misguided sufferers from his vindictive judgment, and to the outraged feelings of the working classes generally. The meeting sees in this a necessity for such an alteration in the appointment of Her Majesty's judges as shall forbid any strongly pronounced political partisan being elevated to the bench, and would urge upon Government and Parliament the adoption of such measures as shall secure the best lawyers and the best men for judges, other than the best Whigs, Tories, or Radicals.

One of the speakers—a Mr. Kenny—read what he stated to be a copy of the agreement which the gas companies now require all their workmen to sign on entering their employment, and denounced it as a one-sided agreement under which the companies could treat the men just as they pleased.

Apropos of the late Trade Congress, *The Times* remarks: "We cannot, indeed, consider it surprising that the most unanimous proceeding of the delegates at Leeds should have been a petition for the release of the imprisoned gas stokers, or that the 'vindictive' sentence pronounced on those offenders should have been made the pretext of a renewed assault on the Criminal Law Amendment Act. The penalty inflicted on the stokers was certainly severe, but its severity has little relevance to the true question at issue, and it will be as well, while the subject occupies its present position in the eyes of the public, to place it in its proper light. The fact is that unionists have a certain ground for complaint, but not the ground they allege. Their grievance would be the same if the gas stokers had been sentenced to three weeks instead of twelve months imprisonment, and it will not improve their case to exaggerate the character of a penalty which to a certain extent was most assuredly merited. The five stokers indicted for 'conspiracy' were the ringleaders in the 'strike,' a 'strike' which hardly a man among the unionists themselves has ever ventured to defend. It was, indeed, about as unjustifiable from first to last as could possibly be imagined. The men had no sufficient reason, even apart from their breach of contract, for leaving their work at all. When they left it, they did so unlawfully, and against the terms of their engagement, and this they did in the firm belief that by so doing they could leave London without light, and so, by means of the public alarm, put an irresistible pressure upon their employers. Nothing could be more reckless or indefensible. It is idle to talk of the possible result as a mere temporary inconvenience to be endured by the rich; it was something far more terrible. No doubt we were more frightened than hurt, and we have learnt that a conspiracy to plunge London in darkness need not import such extreme and universal danger as was naturally presumed. But this does not help the gas stokers. They, as well as the public, believed that the consequent perils to life and property might be formidable in the extreme, and that for the sake of averting them their demands would be instantaneously conceded. It was on this calculation they traded. To intensify the panic, and bring the prospect home more closely to the intended sufferers, they not only 'struck,' but broke their contract with their employers for the sake of 'striking' more effectually. Nobody can deny, after a review of the case, that the conduct of the offenders deserved exemplary punishment, and especially the conduct of those who were foremost in the proceeding, and more or less responsible for the guilt of others. It may have been against the intention of the Legislature that workmen should remain indictable for a conspiracy of that particular nature which was charged against the ringleaders in the gas strike; but these men did, nevertheless, mislead others into a proceeding which scarcely any even of their own class can venture to approve, which was concerted with a most reckless disregard of the public safety, and which, under some law or other, was certainly deserving of signal punishment."

Dr. Frankland's Report upon the Metropolis Water Supply for Dec., 1872, states that, taking the amount of organic impurity in the Kent Company's water as unity, the proportional amount in an equal volume of water supplied by each of the other metropolitan companies was:—New River, 4·7; West Middlesex, 5·8; Chelsea, 6·6; East London, 6·7; Southwark, 7·0; Grand Junction, 7·2; and Lambeth, 7·6. The Thames and Lea were in high flood during the month, and their waters, even after filtration, were very unsuitable for domestic use. Of the five companies which drew their supply from the Thames, only one (the West Middlesex Company) delivered the water in an efficiently filtered condition. On the 3rd of December the samples drawn from the mains of the Chelsea, Southwark, Grand Junction, and Lambeth Companies were slightly turbid; and again on the 24th inst. the Grand Junction and Lambeth Companies delivered turbid and repulsive-looking water, that supplied by the Chelsea and Southwark Companies being slightly turbid. The water of the Lea, which is distributed by the New River and East London Companies, was efficiently filtered on both occasions when samples were drawn for analysis. The Kent Company's water, which is pumped from deep wells in the chalk, had not been affected by the heavy rainfall; its brilliancy remained unimpaired.

NATIVE GUANO COMPANY.

The following are the reports made to the Metropolitan Board of Works by Mr. Bazalgette and Mr. Keates, relative to the experimental operations of this company at Crossness:—

METROPOLITAN BOARD OF WORKS.

Native Guano (A. B. C.) Experiments at Crossness.

Engineer's Department, Spring Gardens, Jan. 11, 1873.

Gentlemen,—Application having been made to you by the Native Guano Company for permission to erect temporary works on your land at Crossness, in order to enable the company to submit for your observation the mode of purifying sewage by the A. B. C. process, you sanctioned the experiment on the 27th of January, 1871, and subsequently directed Mr. Keates and myself to observe and record all the facts bearing upon its operation, and report to you the result. Mr. Keates will report to you the chemical results, whilst I, herein, submit a statement of the quantities of the ingredients used, the cost of the process (exclusive of buildings, plant, depreciation, and wear and tear) and the commercial results.

The company's works and operations were in no way interfered with or restricted by your officers, and the company modified and altered them from time to time according to their own views.

The modifications thus introduced by the company occasioned considerable delay, and it was not until the 27th of August last that they were able to submit their process for our inspection. It was continued from that date up to the 30th of November last, or for a period of about three months.

Before reporting to you the results obtained during that period, I should state that I received, on the 10th inst., from Mr. C. Rawson, the general manager of the company, a letter, bearing date the previous day, addressed to Mr. Keats and myself, urging that certain expenses incurred during the process ought not to be debited to it. But, as his letter had been printed before it was placed in my hands, I assumed that it is intended to be read by others as well as Mr. Keates and myself; and whilst I deem it to be my duty to report to you simply what was done, and not what might have been done or left undone by the company during the three months of the experiment, I must not be considered to assent to the accuracy of the views put forth in Mr. Rawson's letter. It is not for me to say why the company paid £8 5s. per ton for sulphate of alumina if they could have obtained it of equal quality for £2 per ton. Nor did this board require the settling-tanks and machinery to be placed above ground. This was done by the company for obvious advantages to their works, and, had it not been done, other expenses would have been substituted for the pumping now sought to be deducted. There are other arguments in Mr. Rawson's letter to which I should demur; but I proceed to report to you the facts observed.

Between the 27th of August and the 30th of November, 1872, 11,672,737 gallons of sewage were experimented upon, being about 1-343rd part of the average flow of sewage discharged at Crossness, and 1-686th part of the sewage of London; and about 2-7ths the quantity proposed to be treated by the company, who intended to have erected two tanks, each capable of containing 125,000 gallons, by the agency of which they stated they would be enabled daily to effect the conversion into solid sewage matter the deposit from 500,000 gallons of liquid.

The quantity of A. B. C. mixture used in the shape of alum, clay, charcoal lime, and blood, amounted to 166 tons 14 cwt. 1 qr. 13 lbs.; and the sewage treated, assuming it to produce 100 grains to the imperial gallon, 74 tons 8 cwt. 3 qrs. 16 lbs., making a total of 241 tons 3 cwt. 1 qr. 1 lb., giving, in the shape of dried residue, called native guano, 133 tons 7 cwt. 2 qrs. 11 lbs. Besides this the subsiding-tanks contained on the 30th of November last, 41·70 tons more of the wet mud deposit than they did at the commencement of the trial; this would produce a dried residue of 8·34 tons.

The total expenditure amounts to £895 3s. 3d., and may be divided thus:—

Charcoal (refuse animal)			£63 14 9
„ (wood)			3 12 6
Alum (crude)			175 14 7
Clay (alum)			28 18 7½
„ (common)			18 17 0
Blood			2 13 0
Coals			230 11 3½
Lime			0 6 4½
Wages—			
Manufacturing	£220 12 2½		
Mechanical supervision	38 0 10		
Chemical	33 10 4		
Sale account, bagging, and loading	8 15 3		
Office, wages of boy	7 16 1½		
		208 14 9	
Engine stores		14 7 4½	
Manufacturing stores		47 13 0	
		£895 3 3	

This gives the cost of manufacture, taking the dried and wet residue as per fect native guano (141·7199 tons) at £6 6s. 4d. per ton, exclusive of rent interest on capital, depreciation of plant, and other incidental items.

About 80 tons of the deposit were sent across the river to Messrs. Sillars, who are actively concerned in the management of the A. B. C. Company, to mix with fish manure. Two or three tons of it have been put upon a small quantity of land rented by the company at Crossness; about ten tons remain in a wet state, banked up upon the ground, about 40 tons, in a dried state, are in the company's sheds, and a few tons have been sent away in small quantities as samples; but, with the exception of a few shillings, the company's books show no returns in the shape of sales of manure.—I am, gentlemen, your obedient servant, (Signed) J. W. BAZALGETTE, Engineer.

To the Works, &c., Committee of the Metropolitan Board of Works.

To the Works, &c., Committee, Metropolitan Board of Works.

Jan. 13, 1873.

I have the honour to report herewith upon the results of the experimental operations of the Native Guano Company at Crossness, carried on from the 27th of August to the 30th of November last, under the supervision of the engineer and myself on behalf of the board, in accordance with the instructions of the Works, &c., Committee of July 25, 1871. My report relates, however, only to that part of the experimental working which involves chemical and sanitary considerations; the commercial and financial results are given and treated of by Mr. Bazalgette in his report presented to the committee at the same time as this.

The experimental works were set partially in operation early in August, and between the 6th and 27th samples of the effluent water were taken on several occasions, and submitted to analysis; but before making a definite commencement it was necessary that the stock of materials on the premises should be carefully taken; this was not completed until the 26th of August. On the morning of the 27th, however, at nine o'clock, the works were started, and the experiment effectively begun.

It was intended, in the first instance, that the operations should be carried on day and night, but consideration showed that it would be very difficult to keep up such a supervision as appeared desirable during the night. After discussion, it was therefore thought better by Mr. Bazalgette and myself that the works should only go on during the day, and instructions were given to the effect that working should be commenced at 7 a.m. and be continued up to 5 p.m. daily.

It was also arranged that the work should not be continued on Sundays.

The number of days on which the experiment was actually going on was eighty.

To relieve Mr. Houghton from the responsibility of constant attention, and to afford him such assistance as he might require, the board authorized the sending of Mr. Gotto, one of the officers, to Crossness. From the commencement of the experiment, on the 27th of August, up to its termination, on the 30th of November, he accordingly kept a strict supervision over all the proceedings at the works, day by day, during all the working hours, so that an effectual check was held over all the different operations, and as to materials received on and removed from the premises; he also furnished me with a daily record of the state of the effluent water and of all notable circumstances occurring on the works.

With the object of ascertaining with exactness the current effect of the A. B. C. process upon the sewage, daily samples of the effluent water were taken by Mr. Gotto and my own assistant, and these were analyzed day by day as they were brought up from the works. Samples of raw sewage were also taken on several occasions, during the time the experiment was going on, and these were likewise analyzed as they were brought to the laboratory.

The A. B. C process appears to have been simplified since I inspected the Leamington works two years ago; at that time a very complex mixture of ingredients was employed, and the mechanical mode of mixing was cumbrous. At Crossness a much simpler formula, containing only sulphate of alumina, clay, and carbon, with a little lime and blood, was employed, and the mixing was effected without mechanical agency, by allowing the sewage and A. B. C. mixture to meet as they issued from their respective supply pumps and cisterns.

By permission of the board, the Native Guano Company were to have 500,000 gallons of sewage per day of 24 hours; by the reduction of the time of working to ten hours daily, of course this quantity would be reduced in proportion; but, in point of fact, even the reduced quantity was never reached, as the mean quantity treated daily was 145,909 gallons.

The gross quantity of sewage treated during the 80 days of the experiment was 11,672,737 gallons, and to defecate this and precipitate the solid suspended matter, with a portion of that dissolved in the sewage, upwards of 166 tons of A. B. C. mixture were employed. This mixture contained the ingredients in the following proportion:—

Sulphate of alumina	2·5 parts.
Charcoal	14·5 „
Clay	13·0 „

with a little blood, and occasionally lime.

The carbon and clay, as well as the sulphate of alumina, contained, however, in the state in which they were used, a very large per centage of water —more than 50 per cent.—and it is stated by the company, and my own analyses bear this out, that the 166 tons of A. B. C. mixture, as used, contained actually only about 81 tons of dry material. The amount of dried manure ultimately obtained by treating the 11,672,737 gallons of sewage with the 166 tons of A. B. C. mixture, containing, as I have stated, 81 tons of dry material, was about 142 tons, of which it may be said that about 61 tons were derived from the sewage, and 81 tons added in the A. B. C. mixture.

With reference to the chemical part of the inquiry at Crossness, it appeared to me that there were three principal points for elucidation; these were—

1. As to the effect of the treatment of the sewage by the A. B. C. process as a means of clarification and defecation.

2. As to the possibility of completing the preparation of the manure without creating offensive effluvia, which might prove a nuisance to the surrounding neighbourhood.

3. As to the value of the manure produced from the precipitated solid matter.

First, as to the effect of the A. B. C. treatment upon the sewage.

It is to this part of the subject, perhaps, that the greatest importance attaches itself, in a sanitary sense, as upon it depends the solution of the question whether or no the A. B. C. process can so far purify the sewage of towns that it may be allowed to pass into rivers without polluting them to a dangerous degree.

The condition of the effluent water must be taken as the exponent of this purifying action.

The sewage was treated with the A. B. C. material, estimated, in the undried or ordinary state, in the proportion of rather less than 32 lbs. to the 1000 gallons of sewage, and after being thus treated it passed along through five of the settling-tanks, which are 50 feet in length and 20 feet wide, so traversing a distance of about 250 feet, and becoming more and more clarified in its course, owing to the precipitation of the suspended solid matter, which is partly derived from the sewage, and partly from the ad ded ingredients. At the end of the last tank the clarified sewage, or, as it is termed, effluent water, was made to fall over a ledge 7 or 8 feet high, forming a kind of cascade, into a channel below, by which it was finally carried away into the river. This channel is 4 feet wide, and upwards of 270 feet long, and its condition during the experiment was the object of constant inspection, as affording an important indication, among others, of the state of the effluent water which flowe d through it.

As I have stated before, two samples of effluent water were taken daily during the time the experiment was being carried on; these were taken, one early in the morning, the other in the afternoon. In some cases, both samples were analyzed; but generally the two were mixed, and the analysis made upon the mixed liquid. Altogether, seventy-six samples of effluent water were examined; four between the 6th and 20th of August, and 72 between the 27th of August and the end of the experiment on the 30th of November.

In the analysis of effluent water, proceeding from treated sewage, there are two determinations which are considered indicative of its character as a possible source of pollution; these are—the total solid matter, mineral and organic —dissolved in the liquid, and the amount of organic nitrogen, which represents the putrescible principle.

The quantity of ready-formed ammonia contained in such effluent water is of no importance in relation to the question of pollution; in the analysis made of the effluent water from Crossness the ammonia was, however, estimated. The analytical determinations were, then, the quantity of dissolved solid matter (mineral and organic), the organic nitrogen, the ready-formed ammonia, total combined nitrogen, and the amount of chlorine. The quantity of chlorine present is really of no more importance in respect to pollution than ammonia, and it is not registered in the table at the end of this report; but an interesting question having arisen as to the capability of the A. B. C. process to remove a portion of the chloride of sodium present in sewage, I was desirous of settling the point, if possible, and I am now convinced, by the results of several experiments, that the quantity of chloride of sodium is not altered by the A. B. C. treatment.

The state of the effluent water at Crossness was, on the whole, extremely good. Occasionally there was a slight smell of sewage at the point where the water left the last settling-tank and fell over into the channel by which it finally flowed away, but generally there was little or no perceptible smell, and the water was bright and colourless. On a few days the sewage smell was rather strong in the effluent water, but with those exceptions it was, as I have said, very free from odour, and clear and bright in appearance. As it fell from the tank and flowed along the outlet channel, it was also free from the characteristic dirty, persistent froth or scum, which is generally seen in such cases; and on the occasions of my visits during the experiment I did not observe any sewage odour over the settling-tanks, nor along the course of the channel through which the effluent water was flowing.

For some time after the experiment was begun, the outlet channel was cleaned every morning. On the 10th of September I desired that it should be

left untouched, in order that the effect of the effluent water might be noted, and from that date to the end of November the half of the channel most distant from the outfall of the tank was never cleaned. After ten weeks there was no appearance of sewer fungus or other organic growth on the sides and bottom of the channel.

On several occasions samples of the effluent water were kept in closed vessels in the laboratory, with the object of ascertaining whether it would become foul by the putrefaction of the organic matter which it still contained. It was always found that about the second day the sewer odour became distinct in the water, although not very strong; on the third day it remained about the same; but after that the odour became less and less in degree, and in a few days was entirely gone. With respect to this point, however, it must be observed—and I shall have again to direct attention to it—that, owing to the long-continued rain, the sewage at the southern outfall was abnormally weak throughout the whole of the experiment, and that the putrefactive matter present in it, as measured by the amount of organic nitrogen, was considerably below the usual standard. This, of course, rendered the purification of the sewage by the A. B. C. process much easier than it would otherwise have been, and the results, as exhibited in the character of the effluent water, so far manifest a favourable leaning towards the process.

The analysis of the effluent water bears out the above statement as to its comparative purity. The mean composition of the water, in grains per gallon, during the three months experiment, being as follows:—

Total Solids in Solution.	Mineral Matter.	Organic Matter.	Organic Nitrogen.	Ammonia.	Total Nitrogen.
98·70 ..	88·10 ..	10·60 ..	0·188 ..	1·750 ..	1·938

Secondly, as to the preparation of the dry manure without producing offensive effluvia.

After the sewage was mixed with the A. B. C. materials, it was passed through the length of the subsiding-tanks, in which the solid matter was precipitated in the form of thin mud or sludge. The supernatant water was drawn off as closely as possible from the precipitate, which was then pumped up into a peculiar kind of filter, known as Needham's press. By this treatment the mud was brought into the form of a solid cake, still containing, however, about 50 per cent. of water, which had to be, in great part, removed by subsequent treatment.

Up to the 24th of October, there was no means at Crossness of drying the solid material derived from the filters, and an accumulation went on to the extent of between 200 and 300 tons. This mass, which lay for some time in the store, never emitted any offensive smell, although fermentation and considerable heating took place in it.

On the 24th of October, a contrivance for drying the solid matter and converting it into manure was completed, and this drying apparatus continued to work, with occasional stoppages on account of mechanical defects, until the end of the experiment.

In drying the precipitated solid matter of sewage, the great difficulty, irrespective of cost, seems to consist in the liability of the animal matter to burn during the process, and so to give off an offensive stench. Whilst the drying apparatus was in use at Crossness, however, upwards of 130 tons of manure were dried without producing any offensive emanations.

A further experiment was also made with reference to the drying of the mud from the tanks by mere exposure to the action of the air. A space was hollowed out in the ground in the form of a tank, and into this a quantity of the mud was run; the water partly drained away and partly evaporated, leaving the mud progressively more and more consistent. There was no offensive smell developed, although the mud was exposed for 16 or 18 days, and was finally dried off at the end of the experiment by the drying cylinder already spoken of.

Thirdly, as to the value of the manure produced by the A. B. C. process.

With respect to this part of the inquiry, my views are necessarily taken from a chemical standpoint. I have no means of judging of the effects that have been obtained in the practical application of the manure in agriculture, and what I have been able to learn by inquiry seems too vague and conflicting to permit of any satisfactory judgment being formed. Whether or no the fertilizing power of a manure can be exactly measured by its chemical composition, is a question which, perhaps, admits of some discussion. In endeavouring, however, to set a value upon the manure obtained from the working at Crossness, I can only be guided by chemical analysis, giving to the ingredients the understood market value.

The composition of a sample of the manure, as dried in the drying apparatus, and completed ready for sale, is as follows:—

Water	26·45
Organic matter	16·16
Alkaline salts	0·36
Sulphate of lime (traces)	—
Carbonate of lime and magnesia	2·62
Phosphoric acid	0·48
Alumina and oxide of iron	15·42
Insoluble siliceous matter	38·51
	100·00

Total nitrogen in the organic matter, calculated as ammonia, 0·929 per cent.
Phosphoric acid, as soluble phosphate of lime, 0·760 per cent.

The ammonia and phosphate of lime are the only substances present in this manure to which any real manurial value can be attached, as the amount of alkaline salts is too low to materially affect the question.

If the value of the ammonia be taken at 7½d. per pound, or £70 per ton, the ammonia contained in a ton of the manure will be worth 15s. 6d. If the phosphoric acid be calculated all as soluble phosphate of lime, and valued at 3d. per pound, or something under £30 per ton, the worth of the phosphate contained in the manure will be 4s. 2d. per ton; adding the value of the ammonia (15s. 6d.) to that of the soluble phosphate (4s. 2d.), we have 19s. 8d., say 20s. per ton, as the net value of the manure. Whatever value it may possess beyond this cannot, in my judgment, be estimated upon any chemical reasoning, and I am inclined to believe that continued experience will prove the amount mentioned to be about the fair commercial value of the commodity. I have no means of drawing any inference as to the value of the manure from sales made during the Crossness operations, as, so far as I am aware, no actual sales, at least of any quantity, of the manure were made.

Taking into consideration the results of the Crossness experiment, chemically considered, I come to the following conclusions:—

1. That the effluent water was, on the whole, very good. The A. B. C. treatment so far clarified and defecated the sewage that, looking solely to the physical condition and chemical composition of the water produced at Crossness, I am of opinion that such water was in a fit state to be admitted into any ordinary river without producing a dangerous degree of pollution. I must here again direct attention, however, to the extremely dilute state of the sewage during the experiment. The effect of this was to render the results somewhat inconclusive, as it is, of course, impossible to say, at least from this experiment, how far the A. B. C. treatment would defecate sewage of a stronger character.

2. That during the preparation of the manure, including the storing of the moist cakes of mud from the process, and the final drying in the drying cylinder, no offensive effluvia were emitted, and that, taking the experience of Crossness as a guide, the A. B. C. process may be carried on up to the completion of the manure for the market without producing any nuisance.

3. That the value of the manure, as judged of by its chemical composition, does not exceed 20s. per ton.

I beg leave to append a table of all the analyses of the effluent water made during the course of the experiment, commencing the 27th of August, and also of twelve analyses of the raw sewage made at different times during the months of August, September, October, and November. A comparison cannot, however, be drawn between the sewage and effluent water of a corresponding date, as it required some time for the water to pass through the settling-tanks. The effluent water of any particular time would, in fact, represent sewage of a time considerably antecedent. (Signed) T. W. Keates, F.C.S.,
Consulting Chemist, &c.

ON THE UTILIZATION OF WASTE COAL.

By William H. Wahl, Ph. D., Editor of the "Journal of the Franklin Institute," Philadelphia.

The desirability of effecting the economic utilization of the coal waste daily accumulating in the anthracite mining regions is universally conceded. This waste, to take a moderate estimate, is not far from 50 per cent. of the total production. The question has for years attracted the attention of inventors, of those interested in the mining and transportation of coal, and others, the result being the announcement and testing, from time to time, of a number of plans for satisfactorily attaining this object. It is, however, only within the past few years that the growing importance of the problem has attracted general public attention to the attempts at its realization. With every expansion of the industries dependent upon coal for their existence, and therefore highly sensitive to the price of this commodity, the necessity for its successful solution will be enhanced. Thus far, however, it may be safely asserted, no process has been devised for this purpose which could be operated with a reasonable amount of success; a declaration which is verified by the fact that, after a trial of a few months, each has invariably been abandoned, though it is very probable that there are some among the hundred odd patents granted in this country alone under this heading which, under the stimulus that would be afforded their owners by any considerable increase in the marketable value of coal, would prove to be of practical value.

The difficulties in the way of effecting the utilization of the anthracite waste are very great. They involve not only the question of economy of manufacture, which is absolutely controlled by the ruling price of coal at the mines, and which, from a financial standpoint, must necessarily stamp any such plan with a speculative character, but they reside also in the chemical and physical nature of the material.

The processes for the utilization of the anthracite waste consist universally in the employment of a foreign material or materials which shall serve the purpose of a cement to bind the loose particles of the waste together. The cements heretofore used have been both of mineral (incombustible) and of organic (combustible) character. In the majority of instances, as is usually the case with a field of invention just ripening into importance, the patentees of such processes display a characteristic ignorance of, or lofty indifference to, the conditions of the problem they profess to solve. The number and variety of substances which have been secured by inventors, either as cements, or to aid in the cementation or combustion, is well calculated to surprise one unfamiliar with the literature—if such an expression is allowable when applied to Patent Office records—of the subject. The several alkaline substances and their silicates seem to have been held in special favour, since they repeat themselves, with some modifications, in several places. Lime, either alone or with some subsequent chemical alteration into carbonate, sulphate, or silicate, is claimed; or plaster of Paris or hydraulic cement are used directly. Clay must also be named. Among organic substances may be named pitch, coal tar, resin, the Trinidad bitumens, asphalte, petroleum residues, dextrin, glue, Grahamite, &c., while as accessories, employed either to assist cementation or combustion, we have sawdust, chaff, flour, blood, cow dung, starch, sand, saltpetre, and other substances too numerous to mention. Comparatively few of these processes have ever reached a public trial, as indeed few deserve it, and of those which have received attention, none have been more than indifferently successful, either from inherent deficiencies or from commercial reasons. We give a brief survey of some of the more important processes.

For a number of years the bituminous or semi-bituminous waste from the mines of Germany, France, and Belgium has been to a considerable extent successfully utilized by mixing with it from 15 to 30 per cent. of ordinary moist clay, and pressing this plastic mass into forms of any desired shape and size. The product thus obtained, though of inferior heating quality, still secures a ready market, owing to the high price of coal in the countries named, where it finds employment not only for household purposes but also for steam generation. Quite recently a similar process, by which the per centage of cementing clay is reduced to a minimum, has been brought out in this country by a Belgian engineer familiar with the methods employed abroad. His plan, according to description, is to employ about seven per cent. of clay with the dust, and, after thoroughly mixing the materials, to bring the mixture into a pressing machine, where it is pressed into cylindrical forms of convenient size, under considerable pressure. In order to protect the product from the disintegrating effects of rain or dampness, the inventor passes the lumps thus formed through a bath of resin dissolved in benzine, obtaining in this way a thin hide of resin upon the surface of the lumps, which effectually serves the purpose of excluding the water.

The plan, from its simplicity, aided doubtless by the favourable opinion expressed of its merits by a committee of the Franklin Institute, has received the favuorable consideration of the Lehigh Coal and Navigation Company. The abandoned works of a former unsuccessful company, which will be named hereafter, situated at Nesquehoning, Carbon County, Pa., have lately been secured by the Lehigh Company, for the purpose of giving the plan a thorough trial. The expensive machinery of their predecessors has been or is now in process of being modified to suit the present plan.

The same inventor has laboured zealously in this field for a number of years in the South, having for some time successfully manufactured, at Nashville, Tenn., an artificial fuel, by the same general process, from the Southern bituminous coals, until certain business complications conspired to raise the price of the waste to so high a figure that the manufacture was abandoned.

The other plans (employing mineral cement) as yet made public, include those using an alkaline silicate (water-glass) either alone, or in connexion with a chloride of calcium or magnesium, or both, an hydraulic cement, plaster of Paris, &c. As far as the knowledge of the writer extends, none of these have yet passed through the ordeal of practice, and should this have occurred with any one of them, it has simply resulted in a failure. All such attempts must prove unsuccessful, from the fact that either the combustible character of the coal waste is so considerably reduced by the mixture with it of from 10 to 20 per cent. of non-combustible materials, that the product can only be burned with difficulty, necessitating either constant attention or an artificial draught, or the cement employed fuses in the heat of the furnace, and, coating the cemented particles with a liquid glass, prevents the access of the air to it, preventing its combustion, and finally forms an objectionable clinker. For reasons to be specified below, the writer is of the opinion that no process employing a mineral cement will ever be more than indifferently successful, not excepting the clay process, of which so much is anticipated.

It is well known that coal of any description, and especially when in the finely comminuted condition of dust, if exposed for some time to the combined action of air and moisture, gradually deteriorates in heating quality. This deterioration is produced, first, mechanically, by the slow admixture with it of dust and dirt carried by the winds; and, secondly, by a slow process of oxidation, analogous to the rusting of iron, which infallibly attends the exposure of any

readily oxidizable substance to atmospheric influence. From both of these causes the heating quality of the coal waste is slowly reduced (or its per centage of ash, to state the case in other words, is slowly increased), and this reduction in quality grows greater and greater with the time of its exposure. With bituminous lump, Varrentrapp estimates, from careful experiments, that the loss of heating power, from chemical causes alone, may even reach 25 per cent., and for purposes of gas production 45 per cent. With anthracite lump, the deterioration from this one cause alone will be far less than with bituminous; but from both the causes named, it must be evident that, with the anthracite in form of waste, the detrioration must in most cases be considerable enough to gravely influence the success of any plan having in view its manufacture into artificial fuel. By the employment of dust from freshly mined coal, or of a judicious mixture of the old waste with the new, the difficulty from this source may be partially overcome. But no scheme having for its object the utilization on a large scale of the vast waste heaps of the anthracite region can afford to be blind to the objection here named, since it is mainly from more or less deteriorated materials that the product to be utilized must be obtained.

Instead, therefore, of employing in the cementation of the waste a substance incombustible in itself, and which directly adds so much to the per centage of ash, and still further detracts from the heating quality of the waste, the path seems pointed out to inventors to seek about for some cementing material which, being itself combustible, will improve the heating qualities of the poor waste, and which must be free from certain collateral objectionable features incident to the problem. This fact seems to have been recognized long ago, as the list of combustible cements given on a previous page would indicate. Whatever of historical record there has come to our knowledge with regard to their trials, however, is equally unfortunate with the mineral cement processes. In some of the European countries only have the attemps to employ coal tar, pitch, resin, and kindred substances to bind the loose particles of dust into a coherent mass been successful. In this country it has several times been essayed to apply such a process to the utilization of our anthracite waste, but all have signally failed.

Several years ago a company was formed with this object in view, by whom the extensive works at Nesquehoning, Carbon County, Pa., referred to in a former portion of this article, were erected. They employed a mixture of waste anthracite with coal tar. This, after the most thorough mixture which could be attained (with the aid of heat), was pressed into suitable forms, and subsequently transferred to an oven, in which it was subjected to a baking process. From the testimony of several engineers, superintendents, and others who used it, it appears that the product, in spite of the increment given to its heating quality by the addition of coal tar, was but an inferior steam generator. Whether the only partial carbonization of the tar by the baking process allowed the offensive coal-tar odour to be perceived or not, is a contingency not known to us; but it will readily be granted that unless this carbonization was complete, the introduction of the product for the household was impossible from the outset. It is most probable that the complicated character of the process, and the number of details requiring personal attention of workmen, aside from any consideration of the quality of the product, rendered the expense of its manufacture too great to permit of a successful competition with coal, and contributed mainly to the abandonment of the enterprise, which shortly followed. The failure of this, the best organized effort of any yet made to solve the problem of the waste heaps, would seem to indicate that, though similar plans have been and are still in successful operation in continental Europe, the cost of mining coal with us is yet too low to admit of the employment of a tarry or resinous cement to utilize our anthracite waste, even admitting that the fuel produced were of a satisfactory quality.

Of the other patented processes but few are worthy of mention; the great majority read too much like kitchen recipes to deserve serious consideration, as a glance at the list will show.

It is of interest to note that the first reasonable process to utilize this material originated with Mr. Bessemer, in England, where the demand for some such process will be more than ever urgent, now that the English coals have lately risen so considerably in price. Mr. Bessemer's process is for the manufacture of an artificial fuel from bituminous waste, by employing a peculiarly constructed furnace, having a device somewhat like an endless-chain pump, arranged horizontally, upon the successive sections of which the bituminous material, without foreign admixture, is fed in from a hopper above, and is taken continuously from the furnace in a semi-caked, plastic condition, and pressed in suitable forms or moulds, which are then ready for use. This plan has received considerable praise from scientific critics, of which it is indeed well worthy. It is now stated to be in successful operation in several large manufactories in England.

There remain finally to be mentioned several American processes for utilizing coal waste by the use of Grahamite as a cement, which, as far as a judgment of their merits may be formed without the crucial test of practice, may ultimately prove to be satisfactory.

With us, however, for the present, this field of industry lies fallow for want of a cultivator.

ON THE INFLUENCE OF INDIA-RUBBER TUBING ON THE ILLUMINATING POWER OF GAS.

K. Zulkowsky has communicated to the German Chemical Society the results of some experiments on the loss of light sustained by coal gas on transmission through india-rubber tubing. The vulcanized rubber tube employed was about four and a half yards long, in three lengths, joined with one another by pieces of glass tubing, and the apparatus was so arranged that gas could be conveyed at will to the photometer meter, with or without passing through the rubber tube. Paraffin candles were used as the standard of comparison, and the gas was burned at the rate of five feet per hour. The author gives the following table of results:—

Illuminating Power of the Gas.

	Estimated direct.	After passing through Rubber Tube.	Estimated direct.	After passing through Rubber Tube.	Estimated direct.
First series...	13·2	10·7	12·9	.. ....	..
Second „ ...	12·2	9·2	12·1	.. ....	..
Third „ ...	.. ....	7·8	11·2	7·5	11·3
Fourth „ ...	.. ....	9·8	11·6	9·9	12·0

The diminution in the light of the flame after the gas had passed through the rubber tube was so marked as to be readily perceived without the help of a photometer. The author considered the experiments to prove beyond doubt that the loss of light did not result from diffusion of the gas, and consequent admixture of atmospheric air. He believed it to be caused by the absorption of a portion of some or all the light-giving ingredients, and set to work to ascertain to what extent this absorption took place. Having carefully dried and weighed several pieces of black tubing, he passed perfectly dry gas through them for 62 hours, after the expiration of which time the weight of the tubing had increased 8·64 per cent. The appearance of the tubing was not in the least altered, but it had acquired a strong smell of gas. The rubber tubing was afterwards placed under an air-pump with sulphuric acid, when it was found that gas ingredients absorbed were gradually given off again, the sulphuric acid becoming blackened by the products of decomposition. The tubing, however, had not acquired its original weight after remaining 21 days in the exhausted receiver of the air-pump.

The next experiment was to ascertain the volume of gas absorbed, which, in a piece of tube little more than 1-10th of a yard in length, proved to be only 1·1 per cent. in 18 hours. The author therefore infers that only heavy hydrocarbons and the vapour ingredients (benzol and bisulphide of carbon) are taken up by the rubber. An experiment made with pure olefiant gas showed that 9·36 of the volume was absorbed. The conclusions drawn are—1. That, in experiments to ascertain the illuminating power of gas, india-rubber tubing must not be employed if correct results are wished for. 2. That the cause of the diminished light in gas passed through rubber tubing is the absorption of heavy hydrocarbons by the rubber. 3. That, in the analysis of coal or other similar gas, this behaviour of the rubber must be taken into account.

[As the employment of india-rubber tubing is often convenient, if not absolutely necessary, we may mention that the best to use is the red rubber (vulcanized by means of oxysulphide of antimony), which resists the action of hydrocarbons more strongly than the black or grey.—Ed. J. G. L.]

Stoke Gas Company.—The half-yearly meeting of this company was held on the 7th inst.—Mr. C. M. Campbell, chairman of the board of directors, presiding. The accounts presented were received, and the usual dividend of 10 per cent. per annum, with bonus, was declared.

Perth.—Winding Up of the Perth New Gaslight Company.—The available assets and balances of this company have now been realized, and the unappropriated balance amounts to £325. The directors have, therefore, declared a final dividend of 2s. 2d. per share, which exhausts the above-mentioned sum.

Kirkburton Gas Company.—At the meeting of this company on the 7th inst., the question of raising the price of gas was discussed, and it was unanimously resolved that inasmuch as coals were nearly double the former price, and labour had increased in value, the price of gas to consumers be advanced 5d., thus making the price 5s. 10d. per 1000 cubic feet.

Alliance and Dublin Consumers Gas Company.—The directors of this company have given notice of a call of £1 10s. per share on the class B shares, and £1 10s. per share on the class C No. 2 shares, issued in respect of the capital authorized to be raised under the provisions of the 29th and 30th Vic., cap. 205, and on which the sum of £7 10s. per share respectively has already been paid, such call to be payable on or before the 10th prox.

The Institution of Civil Engineers.—At the meeting of this society on Tuesday, the 14th of January—Mr. Hawksley, president, in the chair—twelve candidates were balloted for and declared to be duly elected, including two members. Amongst the gentlemen elected associates were—Mr. Edmund Henry Harris, engineer and manager of the water and gas works of the Wallasey Local Board, and Mr. Benjamin Kitt, gas examiner to the Corporation of Bristol.

Threatened Strike of a Local Board.—At the last meeting of the Ilkeston Local Board a letter from the secretary of the gas company came under notice. The letter gave notice of an advance in the price of gas consumed in the public lamps, making it 43 per cent. in advance of the price paid last year. Five shillings per 1000 feet is the amount now demanded. The local board refused to pay the advanced price, and circulated a notice in the parish to say that the town would remain in darkness so long as the gas company insisted on this rate of payment.

Oldham.—Gas-Fitters Dinner.—On Saturday, Jan. 18, the meter inspectors and gas-fitters in the employ of the corporation held their annual dinner at the Star Inn, King Street. On the removal of the cloth, Mr. James Wilson presided, and Mr. Henry Radcliffe was in the vice-chair. The meeting was enlivened with singing, instrumental music, and dancing; and in the course of the evening the customary toasts were given, and duly responded to. The chairman proposed a vote of thanks to the host and hostess, and Mr. Robinson replied. A vote of thanks to the chairman and vice-chairman brought to a close a very pleasant and interesting meeting.

Hereford (Corporation) Gas Supply.—At the meeting of the Town Council on the 7th inst., the Gas Management Committee reported that the manager has, on different occasions, called their attention to the danger arising from the flooding of the Stone-bow Brook, and that on the previous Sunday, about 2.30 p.m., he was alarmed at the rapid rise of water, it being then about 5½ inches above the level in the gasholder-tank, and was still gradually rising, whereupon he communicated with the mayor, and immediate steps were taken by the use of fire-engines and pumps to keep the water below the level of the pipes, and but for active exertions the pipes must have been flooded and the city in darkness.

Increase in the Price of Gas at Greenock.—On Tuesday last, the Police Board of this town unanimously resolved to increase the price of gas to consumers from 4s. 2d. to 5s. per 1000 cubic feet, being the maximum rate allowed by the Act. This step was, it was stated, rendered necessary by the late rise in the price of coal and labour. Mr. Paul subsequently moved that the former resolution of the board to discontinue discounts be now abolished, but the general feeling was that this step would be unadvisable in the present circumstances, and on a division the motion was negatived. Mr. Paul stated his reason for moving in the matter to be that within the last few days manufacturers had spoken of the probability of their manufacturing their own gas in future rather than pay any exorbitant charge to the corporation.

New Gas-Works at West Calder.—On Friday, the 17th inst., the inauguration of the new supply of gas to West Calder from the works of Young's Paraffin Company, took place in presence of a considerable number of people, among whom were the Revs. Messrs. Grant, Iverach, and Frazer, Mrs. Grant, Mrs. Iverach, Messrs. Munro, John Mungle, Calderwood, Tod, and Fairley. The Rev. Mr. Grant having opened the proceedings with prayer, Mr. Munro, chairman of the gas company, introduced Miss Mungle, who gracefully performed the ceremony of opening the valve and lighting up a star which had been fixed for the occasion. Miss Mungle then, in a few appropriate words, declared the works open for the supply of the village. A number of guests were afterwards entertained in honour of the occasion at the residence of Mr. Alexander Mungle. The gas has since been constantly used in the village.

Broseley Gas Supply.—New works for the supply of this town have just been completed under a contract by Messrs. Willey and Ford, of Exeter. The works were commenced in August, and, in spite of the bad weather, were built, and the mains laid in time to secure a supply of gas by Christmas. During the progress of the works negotiations were opened between the promoters and the Ironbridge Gas Company, which formerly supplied the district, which resulted in the purchase by them of the mains, pipes, services, and meters belonging to the Ironbridge Company, thus preventing what is so often the case under similar circumstances, a bitter opposition. The new works are commodious, and replete with every modern improvement for the manufacture and supply of pure and cheap gas, and are situate about two miles from the town. The expenditure for all matters is under £3500; and from the large consumption anticipated the shareholders rely upon receiving good dividends.

Progress of Gas Lighting in New South Wales.—During 1872 another town in this colony has been lighted with gas. It is over 20 years since Sydney, the metropolis, was lighted; it is ten years since West Maitland was lighted; and five years since Newcastle was lighted; and now Bathurst, which is the largest inland town, and, being situated in the centre of a large mineral district, is rapidly rising in importance. The works are the property of the engineer of the Australian Gaslight Company, Sydney, and are constructed to supply at present about 30,000 cubic feet per day. They have been erected under the

superintendence of Mr. J. Anderson Ward, a son of the owner. An Act of Parliament has been obtained. The town was lighted for the first time on the 13th of May last, and the event was celebrated by a public dinner given by the proprietor. A company has been formed to light Parramatta, another small town. An Act has been passed, and the works are now in progress.

NEWBATTLE.—NEW GAS-WORKS.—The Marquis of Lothian has just completed new gas-works to supply with light the colliery offices, home farm, and the colliery villages on the estate, Newbattle Abbey, and eventually the underground workings in the coal-mines. The works are erected at the village of Newtongrange. Three retorts are in working order, capable of producing 900 feet of gas each every four hours. The gasometer stands about 10 feet high by 30 feet in diameter, and can contain 6157 cubic feet of gas. Pipes have been laid to the village of Newbattle, and Newbattle Abbey gardens and stables, to the parish church, and to the village of Newtongrange, where about 150 of the colliers houses are already lighted with the gas, which is clear and brilliant, being made from the best parrot coal. The whole works have been carried out under the supervision of Mr. Davidson, manager of his lordship's coal-works, and everything connected with the undertaking has been executed on the most approved method.

BRIGHTON GAS SUPPLY.—The corporation gas analyst has presented to the Gas Committee the subjoined summary, as to the illuminating power and purity of the gas consumed in the borough during the year 1872:—"During the year, 208 averaged tests have been taken of the illuminating power of the gas, with the following results:—The Hove gas shows an average value equal to 14·25 in standard candles. The gas was five times below the standard of 14 candles, and twice above 15 candles; the sulphur impurities have ranged from 28 grains to 13 grains in the 100 cubic feet of gas; this improvement has been gradually arrived at through the year's tests, the average figure being 19 grains. The Black Rock gas shows a similar average of 14·25 in standard candles. The gas was three times below the standard of 14 candles, twice above 15 candles; the sulphur impurities were never higher than 19 grains, and as low as 9 grains in the 100 cubic feet of gas, the average figure being 13 grains. Remarks.—The gas from both companies has been sustained up to a standard of 14 candles throughout the year in a regular manner, and the impurities are satisfactorily small."

GLASGOW (CORPORATION) GAS-WORKS.—A short time ago, Sir George Campbell, Bart., of Garscube, brought an action against the Glasgow Town Council, as Gas Commissioners for the city, to have it declared that they were bound to pay him for the minerals in the ground at Maryhill, which they had bought from him for the erection thereon of gas-works. The surface of the ground in question had been conveyed by itself in order to allow building to be proceeded with, while the question as to the minerals was to be settled by arbitration. To this end a regular submission was entered into, and a claim for the minerals lodged for Sir George Campbell, to which answers were put in for the Town Council. It was contended in these answers that the minerals were of no value, as Sir George Campbell had sold the ground for the erection upon it of heavy buildings, with safety to which the minerals could not be worked. This position being maintained by the Town Council, Sir George Campbell brought the action in question, which was to come on for trial eight or ten days ago. Since that time, however, a compromise has been come to, according to which the Town Council have agreed to pay to Sir George £2000 for the minerals, and to pay the expenses both of the arbitration and of the action, so far as it had gone. The action has consequently been taken out of court.

PRESTON GAS COMPANY.—The half-yearly general meeting of the proprietors of this company was held on Monday, the 13th inst.—J. Billington Booth, Esq., in the chair. The notice convening the meeting having been read, the following report was presented:—"Annexed your directors have the pleasure to hand a statement of accounts for the past year, which, notwithstanding the reduction in the price of gas, the shortening of the hours of labour, and the early closing movement, are most satisfactory. The declaration of the usual dividend of 10 per cent. on Stock A, and 7 per cent. on Stock B, will be recommended. Mr. Summersgill's term of office as auditor expires on the 13th inst., but he is eligible for re-election." It was then resolved—"That the statement of accounts to Nov. 30, 1872, and the report of the directors (a copy of same having been sent to each proprietor), be approved, and that they be entered in the book of proceedings." "That, in accordance with the scheme now produced, a dividend on £120,000 Stock A be declared for the last half year after the rate of 10 per cent. per annum; and on £51,000 Stock B after the rate of 7 per cent. per annum, payable on the 1st of February next, at the Preston Branch of the Lancaster Banking Company." The retiring auditor was then re-elected, and, the chairman having retired from the chair, the cordial thanks of the meeting were voted to him for his services on the occasion.

GAS EXPLOSION AT GALASHIELS.—On Saturday evening, Jan. 18, the children in connexion with the Galashiels Free Church Sunday Schools, with their teachers and other friends, were assembled in the Corn Exchange to be entertained with the exhibition of some views of the Arctic Regions by the oxy-hydrogen light and magic lantern. The entertainment was about half through, when, from some cause as yet unaccounted for, the gas exploded with tremendous force. The noise was as loud as the report of a cannon, and the concussion shook the whole building. The weights resting on the gas-bags were thrown to a considerable distance, and a young girl, named Scott, daughter of ex-Bailie Scott, was struck by one of them, and badly hurt, one of her legs being broken above the knee. Another girl, named Kerr, was severely bruised by the same means; and a third, whose name was not ascertained, was much injured. Those sitting nearest the spot where the explosion took place had their faces singed and their eyebrows and hair burnt. The hall was, of course, thrown into darkness, and the alarm and confusion of the stunned and frightened children were extreme. A rush was made for the door, and the seats were overturned in the panic, numbers of the boys and girls being thrown to the ground and trampled upon, and struck by the falling forms. Order and confidence were soon restored, and the wounded children attended to and conveyed home. The wonder is that so few of them were hurt, the meeting being a large and closely-packed one.

DEWSBURY AND BATLEY GAS COMPANY.—A special meeting of this company is convened for the 5th prox., at Dewsbury, when a proposed bill in Parliament, empowering the construction of additional works, and the raising of further capital, will be submitted. The examiner of the House of Commons has declared the Standing Orders complied with in the case of this bill. On Monday, the 20th inst., a meeting of the company was held, to consider a proposal by the joint Town Councils of Dewsbury and Batley with reference to the purchase of the works of the company. Mr. Henry Hemingway presided. Mr. Statter (Wakefield) moved a resolution approving of what the directors had done hitherto, and leaving in their hands any further negotiations. Mr. Atkinson (Leeds) seconded the proposition, but the following amendment, moved by Mr. Ellerton (Wakefield), seconded by Mr. ——, was carried by a very large majority:—"That the thanks of this meeting be given to the directors for their attention and vigilance in entertaining propositions of the joint committees of the Local Boards of Dewsbury and Batley for the purchasing of the gas company's works, and for the more satisfactory position of the question; and, as the joint committees have conceded the reasonableness of the claims of the directors in requiring £12 10s. as the price of the A shares, and £9 7s. 6d. for all the shares subsequently created, this meeting hereby expresses its willingness to accept that part of the proposal; and, with regard to the reserve-fund, this meeting authorizes the directors to concede the balance thereof, after paying thereout all costs and expenses incurred by the directors relating to the arrangement up to the time of its completion, and also the amount that they and the joint committee may consider just and reasonable as compensation to the secretary, manager, clerk, or other officers."

MUNICIPAL CORPORATION (BOROUGH FUNDS) ACT.—The first poll under this Act has just taken place in Sheffield. For some years past a good deal of ill-feeling has been manifested in that town against the water company, and two years ago the Town Council promoted a bill in Parliament for the compulsory purchase of their works. The bill, however, was withdrawn before it went into committee, and the corporation having no funds except from the rates, several members of it who had been most active in its promotion were saddled with the costs. An attempt to pay them out of the rates led to an action being brought against the corporation by the water company in the Court of Queen's Bench. There the decision went against the corporation, and this mainly led to the introduction into the House of Commons of the Borough Funds Act, commonly known as Mr. Leeman's Act, which gives the ratepayers and owners of property the right of deciding by vote whether the corporation shall promote a bill in Parliament, or oppose one introduced by any company; and in the event of the vote being in favour of such promotion or opposition, the costs are defrayed out of the rates. The Sheffield Water Company have given notice of a bill for an extension of powers, and the corporation have lodged a bill for the compulsory purchase of their works. A vote of the owners and ratepayers has just been taken, with this result—a majority of 5422 in favour of the corporation promoting their bill, and a majority of 5817 in favour of their opposing that of the water-works company. The result was officially declared by the mayor (Mr. J. Fairburn) on the 10th inst.

ABERDEEN CORPORATION GAS SUPPLY.—At the monthly meeting of the Town Council, on the 7th inst., Bailie Urquhart called attention to a letter from Mr. Alex. Smith, superintendent of the gas-works, pointing out that the consumption of gas was increasing to such an extent as to render it necessary to provide at once for the erection of new works. The superintendent proposes that the retort-house be extended so as to admit of other 24 retorts, which would produce about 170,000 cubic feet in 24 hours, making a total retort power of 1,050,000 cubic feet; also the erection of four additional dry lime purifiers and two washers; and further, that a telescope gasholder be erected of 420,000 cubic feet capacity, which would give an aggregate capacity of about 1,140,000 cubic feet of holder power, being about 190,000 cubic feet beyond the largest daily consumption at present. The estimated cost of these extensions is about £12,000, and it is stated that about two years would be required to complete the work. The bailie mentioned that these matters had not yet been fully considered by the Gas Committee, and, on his suggestion, the subject was remitted to them to report upon. Bailie Urquhart also observed that rumours had been circulating that it would be necessary to raise the price of gas in the city, but he was glad to be able to say that there was no ground for such a report, even although the cost of coals should not be reduced, which, it was hoped, would soon occur. On the contrary, the committee expected to be able to make a reduction in the price, perhaps before very long.—The Provost: That will be agreed to.—Bailie Donald asked whether the illuminating power of the gas was regularly tested, and if it was kept up to the proper standard, because an impression prevailed that the gas was not so good as formerly, and if the same quality was not maintained there would be no difficulty in lowering the price. Bailie Urquhart was glad this question had been put, for although he had formerly stated what was regularly done in regard to this matter, he found that many persons believed that the illuminating power had been lessened, while at the same time perhaps as many others expressed quite a contrary opinion. The fact was that the illuminating power had not been reduced in the slightest degree. It was fixed by the Act at 30 candles, and it regularly averaged between 30 and 31. Any person who had doubt on the subject could have it tested for himself.

FAVERSHAM GAS SUPPLY.—The committee on this subject held a meeting on Monday evening, Jan. 13, to consider the communication addressed to them by the directors of the Faversham Gaslight and Coke Company on the 11th of December. It will be recollected that the directors expressed their willingness to acquiesce in the proposal to issue new shares to the amount of the debenture stock of the company, conditionally on the new shares being sold by auction and the premiums paid upon them being divided rateably among the old shareholders. This letter was submitted by the town-clerk to Mr. Spice, C.E., for his opinion, and Mr. Giraud read to the meeting a report from that gentleman, in which he said: "Let us see what the effect of such an arrangement would be. The original shareholders, of course, had their shares at par, and between the original shareholders, or some of them, and the few who have recently become proprietors there may be some who bought in at a discount, but as regards the recent purchasers, I am told that they bought into the concern at a premium of 25 per cent. Now, dealing with the latter class first, it is safe to assume that, if the shares they bought were sold by the existing shareholders, those who sold pocketed the premium, because of the obvious fact that it belonged to them; and it is equally safe to assume that, if the said shares were a fresh issue by the company to increase its capital, the premium went into the coffers of the company for the common good of all the proprietors, for the same reason as in the other case, and so those who bought at par and those, if any, who bought at a discount would have their property in the undertaking improved or increased in value *pro ratâ*. This I affirm to be the natural and proper commercial and equitable working of such a concern. And in regard to the proposed issue of £4000 in share capital, the same equitable and sound rule should, in common fairness, be applied. It would, to all intents and purposes, be a fresh issue by the company. The present holders are not asked to surrender a single share. The premiums realized should most certainly go to the common fund of the company, and form a part of the assets, by which all—old and new—shareholders would benefit *pro ratâ*. Further outlay for purifiers being required, the amount realized as premiums would be available to meet the cost, and so the otherwise needful increase of capital for that or any kindred purpose would be avoided. But in the plan proposed by the directors, those who buy the shares to pay off the debentures would add, by the premiums they may pay for them, to the profit and advantage of present proprietors, already complained of as being excessive; and immediately afterwards, it may be, they would find their newly acquired interest in the concern depreciated by a further increase of capital to provide for an extension of plant." The report was adopted, and the town-clerk was requested to forward a copy of it to the directors, with a request that they would have the kindness to give Mr. Spice's observations a careful consideration, and to amend a proposition which was so unsatisfactory to the consumers and the committee. If so, the committee would not have to consider the other alternative which the directors so courteously proposed—the purchase of the undertaking by the consumers.

INVERKEITHING.—SOIREE AND BALL IN THE MUSIC HALL.—Mr. Fraser, banker, Inverkeithing, entertained the men employed at his Fire-clay Works and their friends at tea, supper, and a ball on Thursday last. There were also present the Danish crew of his barque *Henry Woolley*. The party numbered 300. On the platform we observed the magistrates, Mr. Fraser's sons, Lieut. Lamont, of Eastbank; Misses Neil and Halketts, from Edinburgh; Miss Fraser, and others. After tea Mr. Fraser addressed the meeting. He wished the whole party a happy new year, and was glad to see so large and respectable an assembly. He apologized for the absence of Mrs. Fraser from ill health; Colonel Elder, detained by affliction in his house; and his brother, the Rev. H. E. Fraser, of Glasgow, who had been anxious to be present, and to address the meeting, but was prevented by a professional engagement. He gave a history

of his fire-clay works, which were established about 50 years ago, and which he, along with his respected friend, Mr. Sanderson, now manager of the British Linen Bank, Dundee, acquired in 1842. They carried the works on for ten years, when, by Mr. Sanderson's wish, he acquired Mr. Sanderson's share, and since then he had carried them on for his own behoof. The works were now five times larger than when he became connected with it. It was there gas-retorts were first made from fire-clay, which was now a great trade, and he sent retorts to all parts of the world. Such meetings tended to cement classes together and create a good feeling. Many men (including, he was sorry to say, his own miners, now on strike), when they knew their masters were hard pushed to complete contracts, refrained from working and struck work; but his men here were always as glad to hear of large orders as he was, and were ready by night and by day to do their utmost to fulfil them. He thanked his friends for countenancing and assisting at this meeting, and impressed on his audience that men were entitled to be respected in whatever sphere they were placed, if they discharged the duties which devolved on them in the position in which God shall place them. Lieut. Alexander afterwards eloquently addressed the meeting upon the propriety, joy, and happiness arising from such meetings. Several songs were sung by Mr. Fraser and others. The company were also delighted by some Danish songs, which were well sung by some of the Danish sailors present. After supper a number of toasts were given. Mr. Fraser proposed Mr. Moodie, manager, and the men of the brick work, to which Mr. Moodie replied, and stated that if Mr. Fraser got orders he and the men would do their utmost by night or by day to fulfil them. The health of Mr. and Mrs. Fraser was given by Mr. Caution, his remarks being followed by uproarious applause. The younger members of the Fraser family was responded to in a few well-chosen words by Mr. Wm. Fraser, jun., now coal-master at South Lethens. The ball was afterwards opened by Mr. Fraser and Miss Moodie, and dancing was kept up with great spirit till four in the morning. The entertainment went off successfully in every way. All seemed happy, and many declared they had never spent a more joyful evening.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE GAS SUPPLIED IN ST. MARYLEBONE, DURING THE MONTH OF DECEMBER, 1872:—

DECEMBER, 1872.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quantity of Sulphur in 100 Cub. Ft.	Mean Quantity of Ammonia in 100 Cub. Ft.	Sulphuretted Hydrogen.
	*Mean of 23 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Company's gas . . .	15·73	16·60	13·20	20·35	7·40	31·95	0·88	None.
Chartered Company's common gas	16·37	17·00	15·30	21·16	9·62	22·15	1·06	None.
Chartered Company's cannel gas	22·84	24·90	21·50	16·75	10·21	24·28	2·43	None.

Mean of daily readings of barometer . . . 29·36
" " " thermometer . . . 52·47

* Each observation consists of 10 readings of the photometer, at intervals of one minute.

The mean illuminating power of the gas supplied by the Imperial Company during the month was equal to the light of nearly 16 candles; it ranged between 13·20 and 16·60 candles. In the beginning of the month the pressure was often very low, owing to the deficiency of supply consequent upon the gas stokers strike; since then, however, the pressure has gone up to its ordinary standard. The quantity of sulphur impurity in this gas was large, amounting to nearly 32 grains in 100 cubic feet; whilst, on the other hand, the ammonia impurity did not amount to 1 grain. The mean light of the common gas of the Chartered Company was equal to nearly 16½ candles; it ranged between 17 and 15·30 candles. The pressure of this gas was also low at the commencement of the month, but is now satisfactory. I observed in the last three or four months a gradual increase of sulphur impurity in this gas. In August it amounted to only 10·98 grains in 100 cubic feet; on the last month it was 22·15 grains, or more than double the quantity. The ammonia amounted to 1 grain. The cannel gas of the same company gave a mean light equal to nearly 23 candles; it ranged between 21·50 and 24·90 candles. This gas showed also a corresponding deficiency of pressure with the other gases in the first few days of the month. The sulphur impurity amounted to 24·28 grains, and ammonia to 2·43 grains, which latter impurity was unusually large. On no occasion was sulphuretted hydrogen detected by the ordinary tests in either of the three gases. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas manufactured at their works, Horseferry Road, Westminster.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE WATER SUPPLIED IN ST. MARYLEBONE, DURING THE MONTH OF DECEMBER, 1872:—

DECEMBER, 1872.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Ammonia.
	Dec., 1871. 0°	Dec., 1872. 0°	Dec., 1871. 0°	Dec., 1872. 0°	0°
Distilled Water . . .					
West Middlesex water .	19·88	18·98	1·04	0·96	·000
Grand Junction water. .	19·04	19·32	0·86	0·90	·000

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

Throughout the month the water supplied to the parish by the West Middlesex Water Company was bright and clear and well filtered, whilst that supplied by the Grand Junction Company, although generally clear, was slightly discoloured. It is suggested that the subsiding reservoir capacity of this latter company should be increased. A new covered reservoir for the storeage of filtered water is in the course of construction by this company at Kilburn, which when completed will hold 6 millions of gallons.

GRAND JUNCTION WATER-WORKS COMPANY.—Notice is given that the ninth call of £5 on the new £50 shares in the Grand Junction Water-Works Company has been made, and is directed to be paid on or before the 8th prox.

NEW WATER-WORKS AT DUNDEE.—The offer of Mr. Easton Gibb, Aberdeen, to construct the new water-works at Lintrathen for £33,308, was on the 13th inst. accepted by the Dundee Water Commission, and also his offer to construct the bridges for £1465. There were thirteen offerers for the works at Lintrathen, and thirteen for the bridges.

BOSTON WATER-WORKS COMPANY.—The directors of this company have resolved to recommend to the annual meeting of the shareholders, to be held this day, the payment of a dividend of £8 per cent. They have invited Mr. W. J. Ingram, son of the late M.P. for the borough, to dine with the shareholders at the close of the business meeting, as a mark of their esteem for the memory of his father, and their appreciation of the services he rendered the company in the early days of its existence.

HULL WATER SUPPLY.—At the meeting of the Water-Works Committee, on the 13th inst., it was reported that Dr. Franklin and Mr. S. J. Smith, two of the river commissioners, had visited the works, and taken samples of the water supplied to the town. The engineer reported the quantity of water sent into the town during the fortnight averaged 4,643,674 gallons daily; the largest supply was on the 28th of December—viz., 5,119,818 gallons—and the smallest on the 7th inst., 4,418,364. The average available yield was 10 millions of gallons daily. Two accidents were reported as having occurred to the pipes near Stoneferry—one to the 14-inch main. There was a great overflow of water; some of the tenements in the neighbourhood were flooded, and the supply was shut off from the east district until the repairs were done. These were executed without delay.

WASTE OF WATER AT TRANMERE.—At the Birkenhead County Magistrates Court on Thursday last, Sugden William Dalby, a clerk, residing in Seymour Street, Tranmere, was summoned for causing a wilful waste of the water belonging to the Tranmere Local Board. Mr. Henry H. Lloyd, law clerk to the board, supported the information, and stated that there was a great and reckless waste of the township water, and he hoped the bench would inflict substantial penalties on the offenders. Richard Jones, water inspector under the Tranmere Board, then stated that on the 24th ult. he visited the defendant's house, and found the handle of the water-closet propped up with a piece of wood, and the water running to waste. The defendant, who promised that the offence should not be repeated, was fined 10s. and costs. David Bradley, Brougham Street, was summoned for a similar offence. The inspector found the handle of the water-closet propped up with a brick, and it was said the water had been running to waste for two or three days. The defendant was fined 5s. and costs.

GRANTHAM WATER-WORKS COMPANY.—An extraordinary meeting of the shareholders in this company was held at the Exchange Hall, on Wednesday last, for the purpose of considering and approving the bill for which application is intended to be made to Parliament in the next session for supplying with water Grantham and the neighbourhood. Alderman Boyall occupied the chair. After some discussion the proposed bill was formally approved. An impression having gone abroad that the charges to all the consumers would be considerably increased, it was stated, in reply to a shareholder, that such was not the case. To consumers residing in houses of £10 rent and under, the charges will average 25 per cent. less than at present, and from £10 to £22 rental, 10 per cent. less. From £22 to £30, the charges will be slightly increased; from £30 to £35, 7 per cent. less; the rentals above £35 will be increased. These changes are partly owing to the readjustment of the basis upon which the calculations are made, the directors, under the new scale, advancing by £1 at a time instead of by £5 or £10 at once as hitherto.

Register of New Patents.

391.—CHARLES EARDLEY BILLING, of 90, Hatton Garden, in the co. of Middlesex, for "*Improvements in apparatus for heating by the flame of gas.*" Provisional protection only obtained. Dated Feb. 7, 1872.

This invention has reference to that character of apparatus for heating by the use of the flame of gas described in Patent No. 146, Jan. 16, 1868, and the improvements consist in forming the partitions for producing the chambers for the circulation and heating of the air as it passes through such stoves, so that the light of the gas used may pass therethrough, and relates to forming the partitions of sheets of talc or mica set in metal frames, by which, whilst the chambers for the circulation and heating of the air are retained, facility is afforded for the passage of light through such partitions, and by the use of a cover formed to represent lumps of coal, with apertures between; facility is also afforded for giving the appearance to some extent of ignited coal. The covers, or parts thereof representing lumps of fuel, are formed of cut, cast, or moulded glass, coloured, if desired, to represent incandescent fuel.

432.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in gas-engines.*" A communication. (Complete specification.) Patent dated Feb. 10, 1872.

This invention relates to improvements in engines which employ an explosive mixture of air and gas for the motive force. A limited quantity of the explosive mixture is held in reserve, under the pressure of several atmospheres, in a reservoir in connexion with the engine. By a suitable arrangement of valves and valve gearing, a charge of the mixture so under pressure is admitted into a chamber immediately connected with the cylinder, and forced through the meshes of a series of wire gauze diaphragms extending across the chamber. A lambent flame is kept burning upon the surface of the gauze diaphragms by means of a constant but limited supply of gas, and this acts as a torch to ignite the successive charges as they are entering the cylinder. The gauze diaphragms also serve to prevent the return of the flame. By this arrangement the gaseous mixture is made to exert not a spasmodic or explosive force upon the piston, but a true pressure due to expansion.

453.—PETER DODS DEANS, of Leith, in the co. of Edinburgh, merchant, and DANIEL M'NAUGHTON, of Leith aforesaid, merchant, both partners in the firm of M'Lean and Hope, of Leith aforesaid, merchants, for "*Improvements in the production of sulphate of ammonia.*" Provisional protection only obtained. Dated Feb. 13, 1872.

According to this invention, sulpho-cyanide of ammonia is mixed with lime, put into a retort, and distilled. The ammonia vapour is mixed with steam and collected in sulphuric acid. The liquor is heated by a steam coil and evaporated. The sulphate of ammonia is raked out and dried.

459.—JAMES YOUNG, of Kelly, in the co. of Renfrew, North Britain, for "*Improvements in treating hydrocarbons.*" Provisional protection only obtained. Dated Feb. 14, 1872.

The feature of novelty which constitutes this invention is the treatment of that class of hydrocarbons known as natural bitumens with muriatic acid in the gaseous state.

462.—CHARLES WILLIAM EARLE MARSH, of Laurence Pountney Lane, in the City of London, civil engineer, for "*Improvements in meters or apparatus for measuring water or other liquids.*" Provisional protection only obtained. Dated Feb. 14, 1872.

This invention has for its object the arrangement and construction of self-acting apparatus for accurately measuring water or other liquids when flowing at various velocities, or so as to be capable of measuring and registering irregular streams or otherwise.

According to this invention a self-acting tilting bucket or vessel is employed, constructed with two compartments or chambers, and arranged so as to tilt or turn over and empty themselves alternately, by means of floats and weight, of liquid, when the desired quantity is received into one of its compartments, and when one compartment is being discharged the other is placed in position ready to receive the flow of liquid. Each of the measuring compartments is fitted with a float and catch, and as one of the compartments fills with liquid the float rises, and when full it liberates the catch, and the measuring vessel immediately balances over, thus emptying itself and bringing the other part of the vessel into an upright position under the flow of liquid, where it locks itself until acted upon by the float and fluid in the manner previously described. Any suitable registering apparatus is connected with the measuring vessel to indicate the number of movements thereof.

516.—HENRY DEFRIES, of the firm of Jonas Defries and Sons, of Houndsditch, in the co. of Middlesex, for "*Certain improvements in railway carriage, street, and other lamps.*" Patent dated Feb. 17, 1872.

This invention consists, firstly, in surrounding a lamp above the flame with an outer reflector, which, in the case of railway carriage lamps, is fixed to the inside of the roof of the carriage, and in street and other lamps may be supported by arms or stays from the lamp frame or otherwise. The object of this improvement is to increase the reflecting surfaces without increasing the size of the actual lamp or lantern enclosing the burners. Secondly, in placing beneath the flame, and either within or outside of a railway carriage, street, or other lamp, a reflector to be used simply in conjunction with the ordinary top reflector of a railway carriage lamp, or in conjunction therewith, and with the outer reflector of this invention, or in conjunction with any reflector placed above the flame of a street or other lamp. By the use of this improvement the light from the top reflector within the lamp being thrown down on to the reflector below, the flame is again thrown upwards, and when the upper outer reflector of this invention is also used, the light will again be thrown downwards and laterally, and thus be diffused throughout the compartment of the railway carriage, or wherever the lamp may be used, throughout a greater radius than would otherwise be the case. The number of lights within the lamp, whether oil or gas, is optional, and the shape of the reflector regulated by the distribution to be given to the light.

519.—WILLIAM FREDERICK HESHUYSEN, of Amsterdam, Holland, at present of 123, Chencery Lane, in the co. of Middlesex, for "*An automatic water or other fluid regulator.*" Patent dated Feb. 17, 1872.

This invention consists in lining that part of the supply-pipes, where the automatic water regulator is joined, with an india-rubber tube inside, which is compressed by a plunger through a hole in the pipe; an elastic face, a disc, and the plunger is contained on and in a cylinder, and made air-tight by a metal cover. The air is compressed in this cover by the water or other fluid.

523.—ALFRED TYLOR, of 2, Newgate Street, in the city of London, brass-founder, and FRANCIS GEORGE FLEURY, of 24, Merrick Square, Southwark, in the co. of Surrey, engineer, for "*Improvements in apparatus for regulating, controlling, and arresting the flow of liquids and fluids, and preventing waste.*" Patent dated Feb. 17, 1872.

This invention consists in the employment of magnetic action for raising the moving parts of the apparatus in order to allow liquid or fluid to flow through, by which means the employment of stuffing-boxes and cup leathers may be dispensed with. It also relates to special arrangements of apparatus designed to close automatically for preventing waste.

588.—ROBERT PORTER, mechanical engineer, and THOMAS LANE, civil engineer, both of 172, Fenchurch Street, in the City of London, for "*Improvements in apparatus used in the manufacture of gas, parts of which improvements are also applicable to other purposes.*" Patent dated Feb. 23, 1872.

This invention consists in employing a cylindrical retort set vertically, horizontally, or in an inclined position over a coke-box or receptacle for the spent charge, and is fitted with a hopper and short screw for feeding the retort with coal or other gas-making material. Within the retort, and, by preference, on the same shaft as the screw just mentioned, is another screw, the threads or blades of which are made to slope or shelve downwards, and are made in sections, so that a number of them may be attached together and form a continuous thread. The screws are made to rotate either by hand, steam, or other suitable power, and thus carry the charge of coal downward or forward until it is completely carbonized, when it falls into the coke-box below. The furnace for heating the retorts is built with an iron dead surface around the sides and back at about the level of the grate bars. From the outer edge of the dead surface an upright web is formed, on the top of which a flange projects outwards, and upon this flange the inside lining of the furnace is built. Furnaces thus constructed are also applicable to the heating of boilers and other purposes.

616.—VICTOR BABLON, of 40, Rue du Roi-de-Sicile, Paris, France, for "*Improvements in apparatus for measuring the delivery of gaseous, fluid, or other currents, to be named the 'rheometer.'*" Patent dated Feb. 28, 1872.

The object of the present invention is to instantly indicate or measure the delivery of gaseous or fluid currents, which is effected in the following manner. The gas or other current is admitted through a tap or taps of variable orifices (to be employed at will) into a chamber, the pressure of the current in the chamber being indicated by a manometer; from thence it passes through a tap below the burner, and the pressure of supply thereto is indicated by another manometer; thus both the pressure of the current in the chamber, and the pressure of supply to the burner are both indicated by separate manometers.

617.—JAMES YOUNG, of Kelly, in the co. of Renfrew, N.B., for "*Improvements in treating hydro-carbons.*" Patent dated Feb. 28, 1872.

The feature of novelty which constitutes this invention is the treatment of that class of hydrocarbons known as paraffin oils with muriatic acid; the oils are heated, and the muriatic acid, either liquid or aqueous, is brought in contact with the oils during agitation by agitators or dashers in proper vessels.

634.—JOHN WALLACE, of 16, Grove Villas, Grove Street Road, S.E., for "*Improvements in apparatus for burning gas to produce heat.*" Patent dated Feb. 29, 1872.

This invention describes an arrangement for mixing air with gas previous to burning, which consists of a drum, in the cover of which are the burners, and into which the gas is admitted through a series of cones placed base outwards in a line, and allowing the air to enter between them.

670.—FREDERICK GEORGE UNDERHAY, of Crawford Passage, Clerkenwell, in the co. of Middlesex, for "*Improvements in apparatus for controlling the supply of water to dwelling-houses and other buildings.*" Patent dated March 5, 1872.

This is an invention of a cistern divided into two by a partition with a small hole in it; one side is kept full and the water drawn out of the other.

707.—ERNEST OZANNE, of Well Road, in the island of Guernsey, clerk to the Guernsey Gaslight Company, for "*Improvements in apparatus for opening and shutting gas-valves, and in lighting and extinguishing gas-lamps*" Provisional protection only obtained. Dated March 7, 1872.

This provisional specification describes a mercurial governor, also acting as a cut-off valve; it is caused to open and close from a distance by electricity; the electricity also may ignite the gas.

714.—CYRUS AVERY, of Tunkhannock, Pennsylvania, United States of America, now of Little Cross Street, Islington, in the co. of Middlesex, engineer, for "*Improvements in rotary steam-engines and pumps.*" Patent dated March 8, 1872.

This invention relates to a rotary engine whose action is produced by the force of steam ejected from the piston upon an abutment in a circular passage or channel wherein the piston moves. The abutment is so constructed and arranged in the passage that it is operated to move across and away from the path of the piston by the piston itself, or by a cam arranged outside the case or drum in which the piston is enclosed. The area of the channel or passage is uniform at all parts, and the admission and exhaust appertures are so arranged in combination with the piston and abutment that the full pressure of the steam on the piston is maintained nearly throughout its entire revolution.

718.—JAMES YOUNG, of Kelly, in the co. of Renfrew, N.B., for "*Improvements in apparatus for obtaining hydrocarbons from shale, coal, or other similar substances.*" Patent dated Feb. 28, 1872.

The feature of novelty which constitutes this invention is the combining with the distilling kilns or furnaces a tower or chamber containing coke or other material, between the spaces of which the vapours, gases, and oils pass, and the use of a condenser between the tower and distilling kiln for condensing portions of the hydrocarbons.

721.—WILLIAM GRAY, of Highwood House, Hendon, in the co. of Middlesex, for "*Improvements in rotary engines and pumps.*" Patent dated March 8, 1872.

This is an invention of an engine which consists of a drum fixed on the main shaft. The drum works in a casing, and the annular space between the drum and the casing is divided into two equal parts by partitions. Into these two spaces the steam is admitted; the drum is armed with three sliding-pieces, which project to the casing, but withdraw themselves to pass the partitions. The steam acting on one side of these sliding-pieces causes the drum and with it the main shaft to revolve. Means of working the sliding-pieces, valves, &c., are described. The apparatus may also be employed as a pump.

735.—CHARLES WEIGHTMAN HARRISON and ALFRED HORATIO HARRISON, both of Brooke Street, Holborn, in the co. of Middlesex, gentlemen, for "*Improvements in apparatus for heating and cooking by gas.*" Patent dated March 9, 1872.

The novelty of this invention is the general construction of an apparatus which can be used either for cooking or heating purposes, consisting essentially in an open chamber provided with one or more gas-jets for generating the required heat, and reflecting and radiating plates, and so constructed that any number of them may be readily built together; in combining with the said chamber baking, boiling, and steaming vessels, in supplementing for the last-named purposes the heat from the chamber by one or more conical atmospheric gas-burners; in heating water by improved means for utilizing the heat applied in attenuating the gas on its way to combustion; and when the said apparatus is not required for other use, in applying thereto suitable reflectors for heating the atmosphere of rooms.

742.—JOHN BAILEY DENTON, of Whitehall Place, in the co. of Middlesex, civil engineer, and ROGERS FIELD, of Cannon Row, Westminster, in the co. of Middlesex, civil engineer, for "*Improvements in the method of regulating intermittent filtration of sewage and irrigation, and in apparatus for that purpose.*" Patent dated March 11, 1872.

This invention consists in causing the liquid to flow first into a tank capable of holding the exact quantity which it is desired to deliver on to a given area of land, and when the tank is full it is discharged automatically by a syphon on to the land; the tank is then again filled, and discharged either to the same or another plot of land. When the liquid consists of sewage the solid portions are separated from the liquid in a separate chamber before entering the tank, and the accumulated solid matter may be removed from such chamber by apparatus actuated by the flow of liquid from the syphon. Several such tanks may be employed in combination, to be filled in rotation, and the valves or sluices for directing the liquid alternately to the different tanks, as also the sluices for directing the liquid on to different plots of land, may be also actuated by the flow of liquid from the syphon.

768.—THOMAS JAMES SMITH, of the firm of Robertson, Brooman, and Co., of 166, Fleet Street, in the City of London, patent agents, for "*Improvements in apparatus for the production of gases for heating and other purposes.*" A communication. Patent dated March 14, 1872.

This consists in placing a retort filled with turf, dried wood, or other ligneous matter, with its bottom open, in the upper part of a blast-furnace. The gases resulting from the combustion in the furnace mingle with the hydrogen gas produced by the heating of the woody matter in the retort, and hydrogenous combustible gases are thus produced, which after purification serve as powerful heating and lighting agents.

776.—JOHN SOMERVILLE, of the gas-works in the city of Dublin, gas engineer, for "*Improvements in gas-retort lids and mouthpieces, and machinery for luting the same.*" Patent dated March 14, 1872.

This invention has for its object the substitution of machinery for hand labour in luting the lids of gas-retorts, and for this purpose the lids are made with a groove at or near their circumference, which fits on to a corresponding projection formed on the face of the mouthpiece. The lids are furnished with handles which serve also for attaching them to the luting machine, which consists of a platform whereon a water-tank, and one or more pug-mills are erected. Motion is given to the mills by a steam or other engine, whereby the luting materials are brought into condition for use. Arranged above the platform are one or more discs, which are made to support the lids and revolve by means of gearing connected to the engine, or otherwise.

The mill and disc having been put in motion, a lid is placed upon the disc. A tap to the mill is then opened, and a stream of luting material is deposited all round the edge of the lid, the luting being smoothed down by a presser which is brought to bear upon it while the lid is revolving.

The apparatus may be made stationary, or arranged so as to travel along a tram or other way.

783.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*An improved electric torch for lighting gas.*" A communication. (Complete specification.) Patent dated March 14, 1872.

This invention relates to a torch for lighting gas by the generation of an electric current, by means of an electro-ferous operated by hand to liberate the electric spark and cause it to pass to the lighter, which completes the circuit by its contact with the burner. The invention also relates to the construction, arrangement, and combination of the several parts of the torch, whereby it can be easily manipulated by hand to both generate and liberate the lighting spark.

816.—CHARLES JOSEPH TEMPLE, of New Cross, in the co. of Surrey, and ROBERT SKIRROW DANTER, of Holloway Road, in the co. of Middlesex, for "*An improved union-joint or coupling for hose and other pipes.*" A communication. Patent dated March 18, 1872.

The main features of this invention are the use of two loose collars, one on each half of the union, and an india-rubber ring or other packing placed between the two halves. Upon one of these loose collars is cut a portion of a tapering screw thread, the other collar being provided with two lugs which, when the two ends of the hose or pipe are brought together, pass through slots in a flange on the opposite half of the union, and are recessed on the under part to receive the tapering screw thread, which by its wedge shape draws the two halves together in the line of their axes.

819.—GEORGE PASHLEY, of Sheffield, in the co. of York, for "*A new or improved valve for hydraulic and other purposes.*" Provisional protection only obtained. Dated March 19, 1872.

The valve-seat is flat, faced with two or more openings, each communicating with its inlet or other passage. The valve is enclosed and so recessed as to allow communication between the openings, when workad in a rotary or oscillating manner. There is a central guide. Water pressure is admitted to the top of the valve by a small hole from the inlet passage.

825.—JOHN COPELAND, of the city of Manchester, in the co. of Lancaster, engineer, for "*An improved valve to be used for regulating and stopping the supply of steam, water, air, gas, or other fluids.*" Patent dated March 19, 1872.

The object of this invention is to make a valve in which the ordinary glands and packings are dispensed with, and the valve and box containing it manufactured with the greatest economy of manual labour. The valve is at one end or centre of a valve-box, the exit end of which is directly opposite to the supply, and at right angles to the box there is a hole, in which there is a spindle having fixed to it a cam eccentric or lever, central with the valve, and this spindle is turned by a handle or wheel.

To keep the spindle steam, air, or water tight, a conical or flat surface is formed on it, fitted to a part projecting from the valve-box, and this conical or flat surface is kept to its place by a nut, or by a plate and screws.

When the cam eccentric or lever is not in contact with the valve, the pressure of the steam or other fluid keeps the valve closed, but when the handle or wheel is turned more or less, it presses the cam eccentric or lever against the valve, and thereby opens the valve, more or less as required. Or the action may be reversed by making the cam close or regulate the valve, and the pressure of the steam or other fluid open it, the cam as before regulating the position by a handle or wheel.

849.—HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the co. of Middlesex, major-general, C.B., for "*Improvements in the treatment of sewage water.*" Patent dated March 20, 1872.

The chief object of this invention is the extraction from sewage water of the ammonia (which it contains) in a form in which it can be made readily available as a marketable article.

859.—JOHN HOPKINSON the elder and JOHN HOPKINSON the younger, both of Manchester, in the co. of Lancaster, engineers, for "*Improvements in the construction of street-lamps.*" Provisional protection only obtained. Dated March 21, 1872.

These improvements consist in the general arrangement of the lamp and lamp-frame, whereby the shadow formed by the frame is reduced to a minimum, by means of a light wrought-iron frame with a metal ring at the top, into which a glass shade of circular section is dropped from above. The upper portion of the frame has small projecting brackets to carry a dome-shaped or conical cover made of glass or other material.

883.—JOHN BELL MUSCHAMP, of Kensington, in the co. of Middlesex, paper maker, for "*A new or improved liquid-meter.*" Patent dated March 23, 1872.

The novelty of this invention is the construction of a meter which consists essentially of a buoyant valve or disc supported on a vertical spindle, and revolving in a horizontal plane against the under side of a fixed plate, against which it is maintained by its buoyancy. This revolving valve is provided with cavities formed radially around and on its upper surface, and receives its rotary motion from one or more streams of the liquid passing through the meter, which stream through borings formed in a diagonal direction in the fixed plate, the vertical spindle of the revolving disc being provided with suitable mechanism to record the number of such revolutions.

APPLICATIONS FOR LETTERS PATENT.

3930.—WHITE, B., and HENDRY, P. T., Glasgow, "Improvements in treating liquids to be burned for illuminating purposes." A communication. Dec. 27, 1872.
3951.—MACKINNON, H., Toronto, Canada, machinist, "Improvements in lamps to be used for cooking, heating, and lighting purposes." Dec. 30, 1872.
1.—HARRISON, C. W., High Holborn, "Improvements in treating certain gases for lighting and heating purposes, and in combining atmospheric air therewith." Jan. 1, 1873.
7.—PEEBLES, D. B., Fountainbridge Works, Edinburgh, "Improvements in apparatus for regulating and supplying illuminating gas." Jan. 1, 1873.
12.—DE CASTRO, D., Mortlake, Surrey, "Improvements in gas-meters." Jan. 1, 1873.
33.—MICHAEL HENRY, M., 68, Fleet Street, London, patent agent, "An improved water-gauge." A communication. Jan. 2, 1873.
38.—BISCHOF, G., Andersonian University, Glasgow, professor of technical chemistry, "Improvements in the purification of water and in the means and apparatus employed for that purpose." Jan. 3, 1873.
45.—CROLL, A. A., Coleman Street, London, civil engineer, "Improvements in means or apparatus for the distillation of ammoniacal liquors, which improvements are also applicable to the distillation of other liquids, and in the concentration of soluble salts." Jan. 4, 1873.
59.—FOULIS, W., Glasgow, civil engineer, "Improvements in charging and drawing retorts, and in the machinery or apparatus employed therefor." Jan. 6, 1873.
80.—LAKE, W. R., Southampton Buildings, London, "An improved apparatus for manufacturing illuminating gas." A communication. Jan. 8, 1873.
104.—GEDGE, W. E., 11, Wellington Street, Strand, Middlesex, patent agent, "A new or improved water-meter." A communication. Jan. 10, 1873.
115.—HOLMAN, S., 10, Laurence Pountney Lane, London, engineer, "Improvements in gas-retort mouthpieces, lids, and fastenings." Jan. 11, 1873.
118.—JONES, W., Manchester, engineer, "Improvements in valves for regulating the flow of steam, water, and other fluids." Jan. 11, 1873.
136.—HOLMAN, S., 10, Laurence Pountney Lane, London, engineer, "Improvements in apparatus for raising and lowering heavy bodies, particularly applicable to the lids of gas-purifiers." Jan. 13, 1873.
147.—SALMON, P., 5, Mabledon Place, Burton Crescent, London, W.C., engineer, "Improvements in steam-boilers and oil-gas apparatuses, and in oil-gas engines and boilers, and in the apparatuses connected therewith, partly to warm, ventilate, and light railway carriages and other vehicles." Jan. 14, 1873.
154.—SCOTT, H. Y. D., Ealing, Middlesex, major-general, C.B., "Improvements in the treatment of sewage, and of the deposits obtained therefrom." Jan. 14, 1873.
168.—TARGET, J. L. F., Portsdown Road, Middlesex, C.E., "Improvements in treating excreta and sewage matters, and in apparatus employed therein, parts of the apparatus being also applicable to the drying and charring of other matters." Jan. 15, 1873.
173.—PARKER-RHODES, C. E., 27, Somerleyton Road, Brixton, Surrey, "Illuminating public and other clocks," &c. (Complete specification.) Jan. 16, 1873.
183.—SCOTT, H. Y. D., Ealing, major-general, C.B., "Improvements in the purification of coal gas." Jan. 16, 1873.
192.—ERSKINE, F., Salford, and DENBY, W. S., Heaton Norris, ironfounders, "An improved gully or stench-trap for preventing the escape of noxious effluvia or gases from drains or sewers, and for preventing the ingress of solid matters into the same." Jan. 17, 1873.
199.—SHANKS, J., Barrhead, Renfrew, sanitary engineer, "Improvements in water-supply apparatus for jaw-boxes or sinks, baths, wash-hand basins, open boilers, drinking fountains, and street or court wells." Jan. 17, 1873.
202.—GEDGE, W. E., 11, Wellington Street, Strand, Middlesex, "A new or improved system of obturator cock for liquids, gases, and vapours, and an improved aërating faucet or vent-peg of similar construction." A communication. Jan. 17, 1873.
205.—WILLIAMS, M., Lion Oil-Works, Wigan, "Improvements in the manufacture of gas." Jan. 17, 1873.
210.—DAVIES, R. V., Old Street, St. Luke's, Middlesex, "An improved waste-water preventer for domestic and other water-closets." Jan. 18, 1873.
216.—STEVENS, L,, Washington city, U.S.A., "A process for forming carbonic oxide from oxyhydrogen vapour or steam, and an apparatus for utilizing the same for heating purposes." (Complete specification.) Jan. 18, 1873.
220.—HAWKINS, J. G., gas-works, Sheffield, "Improvements in the apparatus used in the manufacture of gas." (Complete specification.) Jan. 18, 1873.
230.—ROBEY, J., Manchester, "A new or improved charcoal to be used for purifying sewage and other foul waters, and for disinfecting and deodorizing purposes." Jan. 20, 1873.
236.—STIDDER, J. G., 50, Southwark Bridge Road, London, sanitary engineer, "Improvements in apparatus for drawing and preventing waste of water from pipes, mains, cisterns, and other sources; also ball and supply valves for domestic and other purposes." (Complete specification.) Jan. 20, 1873.

GRANTS OF PROVISIONAL PROTECTION.

3833.—THORP, T., Manchester, architect, "An improved equilibrium tap and self-closing bush-valve, and the application of the bush-valve to taps in general." Dec. 18, 1872.
3804.—SPENCER, J. H., 23, John Street North, Marylebone Road, Middlesex, "An improved non-corroding water-closet apparatus, water-waste preventer, and overflow alarm." Dec. 6, 1872.
3866.—KENNELLY, T., Birmingham, gas-fitter, "Improvements in blow-pipes used in soldering and brazing metals, and for other purposes." Dec. 20, 1872.
3880.—SYMINGTON, R. S., Glasgow, "Improvements in applying gas for heating purposes, and in apparatus connected therewith." Dec. 21, 1872.
3882.—FEREDAY, W. W., 5, Falmouth Road, Dover Road, Surrey, C.E., "Improvements in treating human excreta, and in apparatus for working the excreta and converting the same into a dry and highly concentrated manure." Dec. 21, 1872.
3895.—CONNIFF, P., Kidwelly, Carmarthen, fire-brick maker, "Improvements in the manufacture of fire-bricks." Dec. 23, 1872.
3897.—MANN, W., gas-works, Dorset Street, City of London, gas engineer, "Improvements in machinery and in apparatus for charging and discharging gas-retorts." Dec. 24, 1872.
3905.—RADFORD, J., Thornton Road, Bradford, Yorkshire, "Improvements in steam, gas, water, or fluid taps." Dec. 24, 1872.
3919.—WILLIAMS, T., Rose Villa, Croft Street, Roath, near Cardiff, "Improved combinations of materials for the manufacture of fire-bricks, retorts, and crucibles, linings for furnaces, cupolas, and vessels in which great heat is employed." Dec. 26, 1872.
3951.—MACKINNON, H., Toronto, Canada, machinist, "Improvements in lamps to be used for cooking, heating, and lighting purposes." Dec. 30, 1872.
1.—HARRISON, C. W., High Holborn, Middlesex, "Improvements in treating certain gases for lighting and heating purposes, and in combining atmospheric air therewith." Jan. 1, 1873.
7.—PEEBLES, D. B., Fountainbridge Works, Edinburgh, engineer, "Improvements in apparatus for regulating and supplying illuminating gas." Jan. 1, 1873.
12.—DE CASTRO, D., Mortlake, Surrey, "Improvements in gas-meters." Jan. 1, 1873.
38.—BISCHOF, G., Glasgow, professor of technical chemistry, "Improvements in the purification of water and in the means and apparatus employed for that purpose." Jan. 3, 1873.
44.—BUCKLEY, S., 8, Tower Street, Hyde, Chester, tool maker, "Improvements in the construction of a combined pipe-wrench and cutter." Jan. 4, 1873.
45.—CROLL, A. A., Coleman Street, London, C.E., "Improvements in means or apparatus for the distillation of ammoniacal liquors, which improvements are also applicable in the distillation of other liquids, and in the concentration of soluble salts." Jan. 4, 1873.
53.—KESTERTON, H., Park Boad, Mosely, near Birmingham, "Improvements in the manufacture of rolled tubes, bars, and plates." Jan. 4, 1873.
59.—FOULIS, W., Glasgow, C.E., "Improvements in charging aud drawing retorts, and in the machinery or apparatus employed therefor." Jan. 6, 1873.
80.—LAKE, W. R., Southampton Buildings, London, "An improved apparatus for manufacturing illuminating gas." A communication. Jan. 8, 1873.

NOTICES TO PROCEED.

2528.—PARKER, J. F., and WADE, A., Birmingham, "Improvements in the manufacture from coal and petroleum of hydrocarbon gas, or gas for illuminating and heating." Aug. 26, 1872.
2587.—LAKE, W. R., Southampton Buildings, London, "Improvements in electrical apparatus for lighting gas and other burners." A communication. Aug. 30, 1872.
3744.—KEY, W., gas-works, Dumbarton, "Improvements in gas-retort settings." Dec, 10, 1872.
2577.—JUDKINS, C., 11, Park Terrace, Brixton, Surrey, "Improvements in wet and dry gas-regulators." Aug. 30, 1872.
2602.—WOODHOUSE, S. J., Holbeck, Leeds, gas engineer, "An improved apparatus for purifying and regulating the supply of gas to burners, also an improved construction of burner and standard tap to be used therewith and for other purposes." Sept. 2, 1872.
2630.—POLLARD, J. W., 9, Mincing Lane, merchant, SCHOFIELD, J., 37, Mark Lane, merchant, and BUTEL, A., 25, Merchant Street, Bow, manufacturing chemist, "Improvements in the treatment of spent oxides of iron, for the purpose of extracting cyanides." Sept. 5, 1872.
2643.—SHANKS, J., Barrhead, Renfrew, N.B., sanitary engineer, "Improvements in water-closets, and in taps or valves for the same and for water-supply pipes." Sept. 5, 1872.
3193.—MACFARLANE, J. R., Manchester, gas engineer, "Improvements connected with furnaces used in the manufacture of coal gas." Oct. 28, 1872.
3180.—MALAM, A., Dumfries, gas engineer, "Improvements in the manufacture of illuminating gas and in apparatus therefor." Oct. 26, 1872.
3559.—QUADLING, E., and MAY, W., Euston Road, Middlesex, civil and mechanical engineers, "An improved machine for manufacturing metal tubes." Nov. 27, 1872.
3882.—FEREDAY, W. W., 5, Falmouth Road, Dover Road, Surrey, C.E., "Improvements in treating human excreta, and in apparatus for working the excreta and converting the same into a dry and highly concentrated manure." Dec. 21, 1872.
3895.—CONNIFF, P., Kidwelly, Carmarthen, fire-brick maker, "Improvements in the manufacture of fire-bricks." Dec. 23, 1872.
3897.—MANN, W., Dorset Street, London, gas engineer, "Improvements in machinery and apparatus for charging and discharging gas-retorts." Dec. 24, 1872.
3919.—WILLIAMS, T., Rose Villa, Croft, Roath, near Cardiff, "Improved combinations of materials for the manufacture of fire-bricks, retorts, and crucibles, linings for furnaces, cupolas, and vessels in which great heat is employed." Dec. 26, 1872.
12.—DE CASTRO, D., Mortlake, Surrey, "Improvements in gas-meters." Jan. 1, 1873.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2036.—CAILLOT, E. J. L., Barcelona, Spain, chemist, "Improvements in the manufacture of lighting and heating gas, and in apparatus and burners connected therewith." July 5, 1872.
2090.—CHANDLER, J., 17, Cottage Grove, Mile End Road, Middlesex, engineer, "Improvements in bath and other apparatus for the control of water and preventing waste thereof." July 11, 1872.
2101.—BENNETT, W. H., 42, Parliament Street, Westminster, patent agent, "Improvements in apparatus for lighting and extinguishing public and other gas-lamps or lights." A communication. July 12, 1872.
2126.—JOHNSON, R. J., 10, Victoria Road, Hatcham, Surrey, builder, "An improved method of sewer ventilation, and in apparatus therefor." July 15, 1872.
2141.—COPLAND, H. S., 1a, Duke Street, Adelphi, Middlesex, C.E., "Improved apparatus for mixing precipitating materials with sewage and removing deposits, which apparatus is applicable also for other purposes." July 17, 1872.
2142.—IMRAY, J., 20, Southampton Buildings, Chancery Lane, Middlesex, "Improvements in apparatus for supporting respiration and light in suffocating or explosive atmospheres." A communication. July 17, 1872.
2166.—EADES, W. and W. T., Birmingham, machinists, "An improved tube-cutter and wrench." July 19, 1872.
2262.—CRAMPTON, T. R., Great George Street, Westminster, "Improvements in the manufacture of gas and fuel, and in apparatus to be used for this purpose." July 29, 1872.
2264.—HAWLEY, J. P., Brixton, "Improvements in cocks and sluices." July 29, 1872.
2280.—JOHNSON, J. H., 47, Lincoln's Inn Fields, Middlesex, "Improvements in water-meters." A communication. July 30, 1872.
2324.—GEDGE, W. E., 11, Wellington Street, Strand, patent agent, "An improved portable pump." A communication. Aug. 3, 1872.
2954.—BAILEY, J., 84, Upper Whitecross Street, St. Luke's, Middlesex, "Improvements in the supply of water to water-closets, urinals, and other places, and in apparatus therefor." Oct. 7, 1872.
3038.—UNDERHAY, F. G., Crawford Passage, Clerkenwell, Middlesex, "Improvements in water-waste preventers." Oct. 15, 1872.
3179.—SMITH, J., Old Ford, Middlesex, engineer, "A new or improved self-acting pressure-indicating escape-valve for steam-boilers and other purposes." Oct. 26, 1872.
3269.—GOLDSMITH, G., and DILKES, J., Leicester, "Improvements in the means of and apparatus for removing obstructions from gas-pipes." Nov. 4, 1872.
3348.—FIELD, R., 5, Cannon Row, Westminster, "Improvements in sewage-tanks, and in the means of effecting the intermittent discharge of liquids from them or other vessels by syphons." Nov. 11, 1872.
3439.—MORGAN, J. C., MACAULAY, H., and WAIDE, F. W., Bath Works, Rotherham, "Improvements in water-waste preventers." Nov. 16, 1872.
3513.—WRIGHT, W., Sheffield, plumber, "Improvements in apparatus for preventing the waste of water, applicable to water-closets and other purposes." Nov. 23, 1872.
3555.—CHURCH, W. C., Lombard Street, London, consulting and mechanical engineer, "Improvements in safety and other valves." Nov. 26, 1872.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3756.—UPWARD, A., BANNEHR, J., and DALE, T. P., "Improvements in the manufacture and purification of gas, and in the utilisation of waste and bye products of gas-works." Dec. 28, 1869.
3771.—WIGHAM, J. R., "Improvements in gas-burners for illuminating beacons, buoys, and lighthouses." Dec. 30, 1869.
3.—HOLMAN, S., "Improvements in apparatus for hinging, adjusting, and fastening gas-retort lids, covers, or doors, and other lids, covers, and doors." Jan. 1, 1869.
38.—EDWARDS, E., "Improvements in cocks and valves." Jan. 5, 1870.
47.—KITTOE, G. D., and BROTHERHOOD, P., "Improvements in the packing of pistons, glands, and pipe and other joints." Jan. 6, 1870.

Share List
OF
Metropolitan Gas and Water Companies.

(Corrected by Mr. F. N. Golding, Sun Court, Cornhill, from the latest Stock Exchange Quotations.)

Number of Shares issued.	Amount per Share.	Name.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	20 — 22
5000	20	Bahia (Limited)	20 0 0	3 0 0	10½ — 11½
1608	20	Do., preference	20 0 0	10 0 0	23 — 25
750	20	Do., do., redeemable	20 0 0	10 0 0	21 — 23
40000	5	Bombay (Limited)	5 0 0	6 15 0	5½ — 6
10000	5	Do., third issue	4 0 0	6 15 0	¼—1 pm.
10000	20	British (Limited) (Norwich, Hull-Seulcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	32 — 34
7500	20	Cagliari (Limited)	20 0 0	7 0 0	15 — 16
160000	10	*Chartered* A shares	10 0 0	10 0 0	14¾— 15¼
20000	10	Do., A	2 0 0	10 0 0	3—3¼ pm.
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	6¾— 7¼
25000	10	Do., 5 per cent. preference	10 0 0	5 0 0	12¼— 13½
20000	10	Do., 5 per cent. preference, second issue	8 0 0	5 0 0	2 —3 pm.
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19½— 20
12000	25	Do., D shares	25 0 0	10 0 0	48½— 49½
17490	100	*Commercial*	100 0 0	10 0 0	153 —156
20000	20	Continental Union	20 0 0	8 0 0	22 — 22½
10000	20	Do., new	10 0 0	8 0 0	1 —1½ pm.
10000	10	Do., new, 1872	2 10 0	8 0 0	½—¾ pm.
10000	20	Do., preference (Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Ruel, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	24 — 25
5000	10	*Crystal Palace District*	10 0 0	10 0 0	15½— 16½
5000	10	Do., preference	10 0 0	6 0 0	10½— 11½
10000	10	Do., new shares	10 0 0	7 0 0	11 — 12
23406	10	European (Limited)	10 0 0	8 0 0	14¾— 15¼
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	8 0 0	2½—3 pm.
4054	10	Foreign and Colonial (Limited)	10 0 0	..	10 — 10½
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	13 — 13¼
1560000	100	*Imperial*	100 0 0	10 0 0	162 —165
26000	12½	Do., new shares	12 10 0	7 0 0	15¼— 15¾
1300	100	Do., bonds	£100	10 0 0	195 —200
80000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	9 2 6	62 — 63
3000	40	*Independent*	40 0 0	10 0 0	66 — 68
8000	10	Do.	10 0 0	5 0 0	8 — 9
3000	20	Do.	20 0 0	7 10 0	25 — 26
	10	Do., D	1 0 0	..	
250000	Sk.	*London*	100 0 0	10 0 0	152 —155
£45000	Sk.	Do., 1st preference	100 0 0	6 0 0	115 —118
	Sk.	Do., 2nd preference	100 0 0	6 0 0	
	Sk.	Do., 3rd preference	100 0 0	6 0 0	
£18781	100	Do., 1st preference stock	100 0 0	6 0 0	
£11828	100	Do., 2nd preference stock	100 0 0	5 0 0	
15000	5	Malta and Mediterranean (Limited)	5 0 0	5 0 0	3½— 3¾
6000	5	Do., preference	5 0 0	7 0 0	5½— 5¾
20000	5	Mauritius (Limited)	2 0 0	7 0 0	2 — 2½
25000	20	Monte Video (Limited)	20 0 0	..	22 — 23
8000	10	Nictheroy, Brazil (Limited)	10 0 0	..	2½—2 dis.
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	6¾— 7¼
30000	5	Do., new shares	2 10 0	9 0 0	1—1½ pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	1¾— 2¼
17500	16	Pará (Limited)	10 0 0	6 0 0	9 — 9½
27000	20	*Phœnix*	20 0 0	10 0 0	31 — 33
3600001.	100	Do., new	45 0 0	7 10 0	13—15 pm.
1440001.	Sk.	Do.	100 0 0	5 0 0	90 — 92
5000	20	*Ratcliff*	20 0 0	10 0 0	31 — 33
34000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	38 — 40
7359	5	Singapore (Limited)	5 0 0	7 10 0	5 — 5¼
2000	5	Do., preference	5 0 0	7 10 0	5¾— 6
1500	32½	Shanghai	32 10 0	12 0 0	32 — 33
4000	50	*South Metropolitan*	50 0 0	10 0 0	83 — 85
4000	12½	Do.	12 10 0	10 0 0	20 — 21
20000	12½	Do., new shares	2 10 0	10 0 0	4—5 pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	15½— 16
10000	10	Do., new	7 0 0	10 0 0	4¾— 5
9000	4	United General (Limerick)	4 0 0	5 0 0	2¼— 2¾
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	14 — 15
1500	10	Do.	10 0 0	7 10 0	11 — 12
2957	10	Do.	10 0 0	7 0 0	
993	10	Do.	3 0 0	7 0 0	
16000	5	*West Ham*	5 0 0	9 0 0	7¼— 7¾
10000	5	Do., new shares	1 0 0	9 0 0	1—1½ pm.
		WATER COMPANIES.			
60000	10	Berlin	10 0 0	11 10 0	18 — 20
12000	100	Chelsea	100 0 0	6 0 0	116 —118
18000	100	East London	100 0 0	6 0 0	118 —120
10000	50	Grand Junction	50 0 0	8 10 0	79 — 81
5840	25	Do., ¼ shares	25 0 0	8 10 0	39¾— 40¾
2160	25	Do., new do.; maximum dividend, 7½ per cent.	25 0 0	7 10 0	32 — 33
4396	100	Kent	100 0 0	6 0 0	119 —121
5339	100	Lambeth	100 0 0	6 5 0	116 —118
1161	100	Do.	20 0 0	6 5 0	
442	100	New River	100 0 0	8 0 0	170 —180
4443	100	Do.	20 0 0	8 0 0	36 — 38
4000	100	Do., debenture stock, 4 per cent.	100 0 0	4 0 0	95 — 98
3036	100	Southwark and Vauxhall	100 0 0	5 10 0	104 —106
1296	100	Do., preference stock	100 0 0	5 0 0	99 —101
	100	Do., D shares	100 0 0	5 10 0	103 —105
		Do., G shares	..	4 10 0	
	100	Do., new ordinary	..	4 10 0	
1600	100	Do., new ordinary, No. 1	40 0 0	4 10 0	
13913	61	West Middlesex	61 0 0	£6 per sh.	116 —118

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1 in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle and Middlesboro'.	Wales.	Yorkshire, Derbyshire, and Staffordsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1 (g.m.b.)	—	5 14 6	—	—	—
1½ and 2 inch Socket-pipes	11 0 0	10 10 0	10 10 0	10 10 0	10 10 0
2½ and 3 inch do.	10 10 0	9 15 0	9 10 0	9 15 0	9 15 0
4 and 5 inch do.	10 0 0	9 10 0	9 0 0	9 10 0	9 10 0
6 inches and upwards, do.	9 10 0	9 0 0	8 17 6	9 0 0	9 0 0
Retorts, 1st fusion, hot blast	10 10 0	9 15 0	10 15 0	9 15 0	9 15 0
Do., 2nd do., cold do.	—	—	—	—	—
Tank Plates, ¼ thick and above	11 10 0	11 0 0	11 0 0	11 0 0	11 0 0

WROUGHT-IRON TUBES AND FITTINGS.

(Subject to 25 per cent. discount.)

Internal Diameter in Inches.	2	1½	1¼	1	¾	½
TUBES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Assorted, 2 to 14 feet, per foot	1 9	1 2	0 11	0 8	0 6	0 4½
Pieces, 12 to 23½ inches, each	3 0	2 0	1 8	1 4	1 0	0 9
Do., 3 to 11½ do.	2 3	1 4	1 1	0 11	0 8	0 6
Longscrews, 12 to 23½ do.	4 0	2 6	2 0	1 6	1 2	0 11
Do., 3 to 11½ do.	3 0	2 0	1 3	1 0	0 10	0 8
Bends and Lamp Bends	4 3	2 3	1 9	1 3	0 11	0 8
Springs, various elevations	3 3	1 8	1 4	0 11	0 9	0 7
FITTINGS.						
Square Elbows, equal or reducing	3 6	2 3	1 9	1 2	0 10	0 8
Round Elbows	3 10	2 6	1 11	1 4	1 0	0 9
Tees, equal or reducing	3 9	2 6	1 2	1 3	1 0	0 9
Crosses, do.	5 3	3 6	3 0	2 3	1 9	1 5
Sockets, reducing	1 3	0 11	0 9	0 7	0 6	0 5
Caps and Plugs	1 3	0 10	0 8	0 6	0 5	0 4
Nipples and Backnuts	1 0	0 8	0 6	0 4	0 3½	0 3
Sockets, plain	1 0	0 7	0 6	0 4	0 3½	0 3
Iron Main-Cocks	18 0	11 0	8 6	6 6	4 6	3 6
Syphon Boxes, 2 quarts	23 0	19 0	18 0	17 0	16 9	—

LONDON METAL MARKET.—*Per Ton.*

	£ s. d.		£ s. d.
Copper, tough cake	96 0 0	Tin, English block	148 0 0
Iron, Welsh bar	12 5 0	Tin-plates, best coke I. C.	1 15 6
Lead, English pig	22 5 0	Spelter, foreign	24 10 0

FREIGHTS.

COASTWISE.—*Per Ton.*

Newcastle—	s. d.	s. d.
Chatham and Rochester	6	6—7 0
Cork		—
Dover, Folkestone, and Ramsgate		—7 3
Dublin		—
Exeter Quay		—
Ipswich		—
London (from Leith)		—7 0
London (Pool)		—7 3
Lowestoft and Yarmouth		—
Portsmouth and Southampton	8	6—9 0
Plymouth	£9 10s.—£9 15s. p. keel.	
Shoreham		—
Whitstable		—7 3
Weymouth		—

FOREIGN.—*Per Keel.*

	£ s.	£ s.
Barcelona		—21 0
Bordeaux		—12 0
Boulogne and Calais		— 8 10
Cadiz		—14 0
Cronstadt		—
Copenhagen		—
Genoa		—20 0
Hamburg		—10 0
Havre de Grace		— 9 0
Leghorn		—19 0
Lisbon		—11 0
Rotterdam		—11 0
Stettin		—
Trieste		—20 0
Venice		—23 10

GAS COALS.—*Per Ton.*

Scotch Cannels, f.o.b.—	s. d.
Boghead, at Bo'ness	77 6
Capeldrae, at Burntisland	45 0
Cowdenbeath, do.	—
Donnibristle, do.	—
Kirkness, best, do.	—
Lesmahago (Auchin.), at Granton	46 0
Do. (Duke of Hamilton's), do.—	
Main	43 6
Wee	46 0
Do. (Nitshill Co.'s), do., and at Glasgow	47 6
Lochgelly, at Burntisland	—
Muirkirk	—

Scotch Cannels, f.o.b.—	£ s.
Arniston, at Leith	—
Elphinstone Tower, do.	—
Grange Cannel, at Bridgeness	—
Haywood, at Granton	—
Kinniel, at Bo'ness	—
Lanemark, at Glasgow	—
Lochore, at Burntisland	45 0
Lothian's Cannel, at Leith	—
Myles' do.	—
Pirnie, at Methill	26 6
Waverley Seam, at Burntisland	—
Old Wemyss Cannel, at Wemyss	45 0
Wemyss Rhumes Cannel	22 6

Newcastle (Unscreened)— Per Ton.

Haswells, Nettlesworth Primrose, and South Pelaw —

Felling, Framwell Gate, North Pelton, Walker's Primrose, West Wear, and Whitwell Primrose —

Burnhope, Charlaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Pelton Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, West Pelaw, Wearmouth Hutton, and Witton —

Peareth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton —

Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, South Peareth, Urpeth, Washington, and West Leverson —

Ramsay's Newcastle Cannel 30 0

Wigan Cannel, f.o.b. at Liverpool 40 0

CHEMICALS.

	£ s. d.		£ s. d.
Ammonia—		Iron Salts—	
Sulphate, white and grey	19 15 0	Green and rusty Copperas	3 0 0
Do., brown	18 10 0	Dry do.	2 15 0
Benzole, 30 per cent.	0 3 3	Sulphuric Acid	3 10 0
Carbolic	0 1 4		

SUNDRIES.

	£ s. d.	£ s. d.
Best Newcastle Fire-bricks, per 1000		— 4 0 0
Do., Fire-clay Retorts, per foot run	0 7 0	— 0 7 6
Cliff's Fire-bricks, at Wortley, per 1000		— 3 10 0
Ingham's best Wortley Fire-bricks, on rail or boat, per 1000		— 3 10 0
Farnley Iron Co.'s Fire-bricks, do., do.		— 3 10 0
Wortley Fire-clay Retorts, per foot run	0 5 6	— 0 7 6
Tarred Rope Yarn, per cwt.		—
Fraser's best Fire-bricks, f.o.b. at Inverkeithing		— 2 10 0
Do. Retorts, per foot run	0 5 0	— 0 7 6
Do. Ground Fire-clay, per ton		— 0 10 0
Stourbridge Fire-bricks, per 1000		— 3 0 0
Do. Fire-clay, per ton		— 0 12 0

PROPOSED SEWAGE OPERATIONS AT WIMBLEDON.—The report of the Government inspector, Mr. Arnold Taylor, upon this scheme has just been published. The inquiry, which was held in July last, arose upon a petition of the local board of that district for power to take under a Provisional Order and by compulsory purchase certain lands required by them for the purposes of sewage outfall and purification. The land proposed to be taken consists of about 10 acres on the Wandle, near the Garratt Lane Paper Mills, the property of Mr. Beaumont and Mr. Knight, on the easterly boundary of the district; of 9 acres 18 perches on the Beverley Brook, near Coombe Bridge, the property of Mr. Drax, M.P., at the westerly boundary. At each of these points 7½ acres are proposed to be laid out in four filtration areas of nearly 2 acres each, and the rest of the land in reservoirs, tanks, drying-kilns, approach roads, &c. At each outfall it is proposed to construct a reservoir for the sewage flow at nights and on Sundays, and two deposit-tanks, the reservoirs to hold 500,000 gallons and the two deposit-tanks 337,500 gallons. The sewage, in its passage to the latter, is to be mixed with lime. After the subsidence of the lime and sewage sludge which the lime will carry with it, the clarified liquid is to pass on to earth filters, each one of which will be filled in succession, except during heavy rains, when it may be found necessary to use the entire filtration area at one time. The scheme was opposed by the owners of the land proposed to be taken, and also, as regards the site of the eastern outfall, by the Wandsworth Local Board, and owners and ratepayers in that district. The Metropolitan Board of Works attended by their solicitor to watch the proceedings, they being interested in the matter, inasmuch as the river Wandle and the Beverley Brook are vested in them as main sewers under the 18th and 19th Vic., c. 120. The conclusions arrived at by the inspector, after a lengthened inquiry, are—1. That, as regards the eastern outfall, the situation is so unfavourable, the soil so stiff, and the land so liable to constant saturation and intermittent flooding, as to render the site a most undesirable one on which to construct tanks and reservoirs in connexion with a system of intermittent earth filtration for the purification of the sewage of the eastern portion of the district; 2, that, as regards the western outfall, these drawbacks do not exist. The inspector therefore recommends that the prayer of the petition be dismissed with respect to the lands proposed to be taken near the Wandle, and that it be granted with respect to the lands belonging to Mr. Drax, situated near the Beverley Brook. He suggests, however, that before any steps be taken in reference to a Provisional Order, the question be again remitted to the Wimbledon Local Board, as it is possible that the dismissal of so much of the petition as relates to the land at their eastern outfall may lead the board to modify their proposed system of internal main drainage, as well as that for the storeage and purification of the sewage at their outfall works.

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BEALE'S IMPROVED PATENT GAS-EXHAUSTERS,

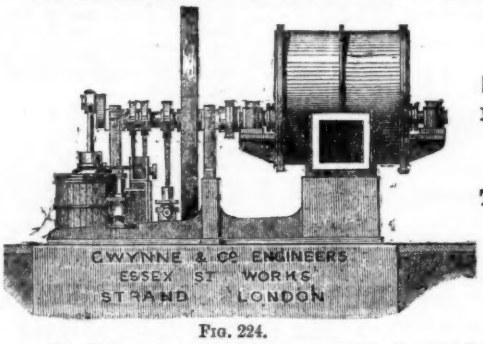

FIG. 224.

WITH

GWYNNE & BEALE'S

PATENT

IMPROVEMENTS,

Made under the personal superintendence of

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GAS-EXHAUSTING MACHINERY.

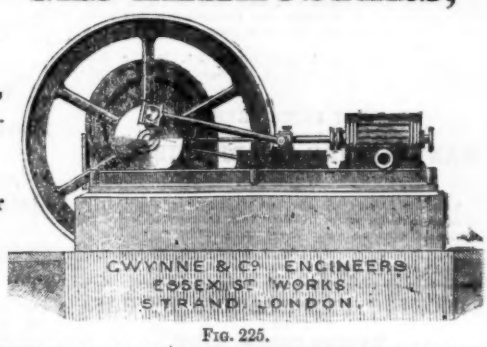

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. do not pretend to enter into a struggle with other makers in respect to **cheapness.** They have never sought to make **price the chief consideration,** but to produce Machinery of the very highest quality, and the most approved design and arrangement. Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result.

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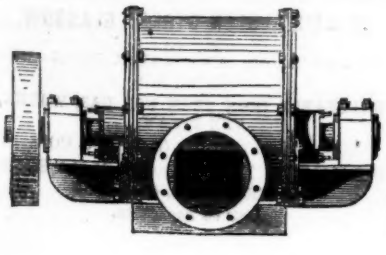

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WANTED, by the Advertiser, aged 30, a situation as MANAGER. Thoroughly understands the manufacture and distribution of gas, can set retorts on the most modern principle, lay mains or services, fix meters, or do anything connected with a Gas-Work.
Address PNEUMO, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS AND WATER COMPANIES, MANUFACTURERS, &c.

THE Advertiser, a middle-aged Man (an Army pensioner), who can be well recommended for steadiness, sobriety, and integrity, desires to obtain employment as Watchman, Messenger, or Light Porter, and to make himself generally useful.
Address T. K., 90, Carlton Street, Kentish Town, LONDON.

TO ENGINEERS AND METER MANUFACTURERS.

THE Advertiser will soon be at liberty for a re-engagement as TRAVELLER to any well-known firm, to call upon Companies and others, in town and country; or as Manager and Overlooker of fair sized works, having had over 20 years practical experience in manufacture, &c.
References exchanged upon application, in the first instance, to ROBERTUS, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

COST PRICE SHEETS.

MANUFACTURE AND DISTRIBUTION OF GAS.

As these Sheets are now out of print, modifications, if desired, can be made in the New Edition to suit the system or convenience of those using them.
W. J. WARNER, ENGINEER.
South Shields, Oct. 1.

COOKING AND HEATING BY GAS,

BY
MAGNUS OHREN, A.I.C.E.

NEW AND REVISED EDITION.

Prepared for Gas Companies to circulate amongst their gas consumers.

£1 per 100; £3 15s. per 500; or £6 per 1000.

Address, MAGNUS OHREN, Gas-Works, Lower Sydenham, London, S.E.

"DON" ECONOMIC LUBRICATING OIL is about 40 per cent. cheaper than the kinds heretofore used by Gas Companies, many of whom have adopted it. The Alliance Gas Company say, "Your 'Don' Oil gives us every satisfaction." Trial casks sent on approbation.—DUNCAN BROTHERS, 2, Blomfield St., LONDON, E.C.

PURIFIERS WANTED.

WANTED, two Wet Lime Purifiers, complete, and in good working condition.
Address, stating particulars and price, to ENGINEER, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, No. 300 of the Journal of GAS LIGHTING, to complete a set. Any person having one to dispose of can obtain the marked price on forwarding it to X. A., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a second-hand cast-iron TANK and GASHOLDER, about 36 ft. diameter by 14 ft. deep. Also Two Dry Lime PURIFIERS, each about 5 ft. square, with connexions complete.
Apply to Messrs. J. AND W. ROMANS, Engineers, &c., 1, Walbrook, Mansion House, LONDON, and 8, Forth Street, EDINBURGH; or to the SECRETARY, South Molton Gas Company, DEVONSHIRE.

FOR SALE.—Messrs. John Mayall, Spinners, Morley, near Manchester, are prepared to SELL the whole of the GAS PLANT which formerly supplied their works with gas, consisting of Retorts, Purifiers, Gasholder, &c., and which is capable of making about 35,000 cubic feet per 24 hours.
Applications to be addressed to the Firm, or to Mr. D. GRAHAM, Engineer, Stalybridge Gas Company.

TO GAS APPARATUS MANUFACTURERS, & OTHERS.

TO BE SOLD, two valuable Inventions in connexion with apparatus used for the manufacture of gas.
For particulars and terms, which would be exceedingly moderate, apply to Mr. W. H. BENNETT, 42, Parliament Street, WESTMINSTER, S.W.

THE Abergavenny Improvement Commissioners invite TENDERS for the supply of a Boiler, Engine, and Beale's Exhauster. Also for a Purifier 10 ft. square, 5 ft. deep.
For particulars, apply to the MANAGER, S. Cross, Abergavenny, MONMOUTHSHIRE.

THE Keighley Local Board of Health have FOR SALE Four Dry Lime PURIFIERS, 10 ft. square and 4 ft. 2 in deep, with hydraulic centre-valve and connexions, and lifting apparatus.
The above are offered for sale on account of being replaced by larger ones.
Particulars may be had on application to the undersigned, at the Gas-Works Offices, Low Bridge, KEIGHLEY.
Jan. 21, 1873. J. LAYCOCK, Superintendent.

TO GAS COMPANIES.

THE following, which are offered for Sale, are in good working order, and are worthy of the attention of Companies which are in course of formation, or of Private Individuals—viz.: 3 Purifiers, 4 ft. square; 3 stacks of Condensers, Scrubber, Station-Meter (requiring repairs), a small Boiler and Forcing Pump for cleaning the Condensers, together with the necessary Valves and Connexions, as now standing in the Company's Works. The same to be removed by the purchaser.
The above are sold in consequence of the Company requiring larger apparatus.
For particulars, apply to the Secretary, EYTON WILLIAMS, Vale Street, DENBIGH.
Denbigh, Dec. 13, 1872.

BOROUGH OF SALFORD.

THE Gas Committee are prepared to receive TENDERS for a GAS-EXHAUSTER, with engine attached, capable of passing 200,000 cubic feet of gas per hour.
Particulars can be had from the MANAGER, at his Office, Gas-Works, Lamb Lane, Salford.
Tenders to be delivered at the Gas-Works, Lamb Lane, on or before the 28th inst., addressed to the Chairman of the Gas Committee, and endorsed "Tender for Exhauster."
Jan. 22, 1873. By order.

THE BIRMINGHAM AND STAFFORDSHIRE GAS-LIGHT COMPANY.

THE Birmingham and Staffordshire Gaslight Company invite TENDERS, for a term of years, for their make of TAR, from the 1st day of January, 1874, for the whole make, or separately for the respective works at West Bromwich, Adderley Street, and Saltley.
Tenders to be sent in on or before the 1st day of April next.
The Directors do not bind themselves to accept the highest or any tender.—By order of the Board,
SAMUEL WALSH, Secretary.
Old Square, Birmingham, Jan 14, 1873.

TORBANEHILL MINERAL.

For Sale, by Tender,

FOR WHOLE OR PART,
SEVERAL THOUSAND TONS OF THE
Celebrated Torbanehill Mineral,

Saved from the fire at Torbanehill in June last.
The mineral as it at present lies has been examined and analyzed by Dr. WILLIAM WALLACE, Analytical Chemist, Glasgow, who says:
"Very great care was employed to obtain reliable average samples, and the results show that the mineral is not appreciably damaged."
The results of two testings of fair samples of the Coal give 14,080 cubic feet of 43·7 candle gas.
APPLY TO
MR. DAVID STEWART,
128, INGRAM STREET, GLASGOW.

ROBERT MACLAREN and CO.,
EGLINTON FOUNDRY, GLASGOW;
Manufacturers of all sizes of Cast-Iron Main-Pipes by an improved Patent, General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

FIRE-CLAY RETORTS.

WILLIAM FRASER,
INVERKEITHING,
(Owner of the Works at which Fire-Clay Retorts were first made), can supply
RETORTS, FIRE-BRICKS, &c.,
to any extent.
References can be given to managers of above a hundred Gas-Works whom he supplies.
He ships at Charlestown his
CELEBRATED HALBEATH STEAM COALS,
on Navy List.

CLOTH GAS-BAGS FOR MAINS,

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber and Gutta-Percha Machine-Bands, Sheet and Washers for Steam Joints.
T. BUGDEN, Manufacturer,
79, GOSWELL ROAD, LONDON, E.C.

THE PATENT
CATOPTRIC LAMP,
for Streets and all Situations where the Light ascending above the level of the Lamp is wasted,
Is now in use in Moorgate Street, London, and has been in successful operation upon Waterloo Bridge, since Oct. 7, 1871.
T. A. SKELTON, 37, Essex St., Strand, LONDON,
INVENTOR AND PATENTEE.

THE BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is hereby given that the FIRST ORDINARY GENERAL MEETING of the PROPRIETORS of this Company will be held at the London Tavern, on FRIDAY, the 7th day of February, 1873, at Two o'clock in the afternoon, for the following purposes:—
"To receive the directors report and statement of accounts.
"To declare a dividend.
"To elect Directors and Auditors.
"To determine the remuneration of the Directors, Auditors, and Secretary.
"To authorize the Company to borrow on mortgage as much money as the Company by their special Act shall be entitled to borrow.
"And for other business." By order,
W. C. HUMPHRYS, Secretary.
Chief Office, Albert Road, New Barnet, Jan. 20, 1873.
The Transfer Books will be closed from the 24th of January, to the 7th of February, inclusive.

This day, in roan tuck, price 6s., postage 4d.,

WEALE'S ENGINEER'S, ARCHITECT'S, AND CONTRACTOR'S POCKET-BOOK for 1873.

Containing a vast mass of useful Tables, Formulæ, &c., and including a Gas Engineer's Calendar, with 8 copper plates.
"Every branch of engineering is treated of, and facts, figures, and data of every kind abound."—*Mechanics' Magazine.*
London: LOCKWOOD & Co., 7, Stationers' Hall Court, E.C.

Just published (Second Edition, revised and enlarged),

A GUIDE TO GAS LIGHTING.

By ALFRED H. WOOD, Gas Engineer, Hastings.
This work has been written expressly for the purpose of correcting some of the errors of gas consumers on points connected with the combustion of coal gas and improper internal fittings, burners, and glasses.

REVIEWS, ETC.

From H. LETHEBY, Esq., M.B., M.A., &c., Chief Gas Examiner to the Metropolis: "Your pamphlet, I think, is likely to be very useful to gas people."
From the JOURNAL OF GAS LIGHTING, Nov. 19, 1872: "Mr. A. H. Wood, of Hastings, has published a second and enlarged edition of his 'Guide to Gas Lighting.' It is full of sound practical instruction for consumers, and is an excellent book for companies to circulate among their customers."

Price (post free):	£	s.	d.
One copy	0	1	0
Twelve copies	0	10	6
One hundred copies	3	15	0

To be had direct from the Author, A. H. WOOD, Gas Engineer, HASTINGS; or Mr. W. B. KING, 11, Bolt Court, Fleet Street, LONDON.

Now ready, price 25s., bound in cloth, lettered,

THE TWENTY-FIRST VOLUME
OF THE
JOURNAL OF GAS LIGHTING,
WATER SUPPLY, AND SANITARY IMPROVEMENT.

Also cloth cases, gilt lettered, for binding Vol. XXI., price 2s. 6d.

LONDON:
WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, E.C.

Just published, price 1s.,

THE STORY
OF THE
RYDE GAS ARBITRATION.

By R. P. SPICE.
With a Plan of the Works.

DEDICATED
TO THE
DIRECTORS of the GAS COMPANIES
AND THE MEMBERS OF THE
LOCAL BOARDS OF THE UNITED KINGDOM,
BY THEIR HUMBLE SERVANT,
THE AUTHOR.
21, PARLIAMENT STREET,
Aug. 12, 1872.

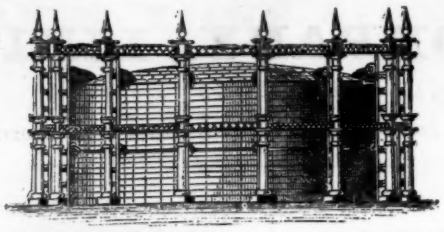
London: EDWARD STANFORD, 6 & 7, CHARING CROSS, S.W.
Ryde: E. & M. A. GIBBS, UNION STREET.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,
METAL MERCHANTS AND CONTRACTORS,
18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES AND FURNISHINGS.
MALLEABLE IRON TUBE FOR GAS, WATER, AND STEAM.
AGENTS FOR THOMAS GLOVER & CO.'S
PATENT DRY GAS-METERS
DELIVERY F.O.B. ON CLYDE.
Lists on application.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

PATENT RIBBED RETORTS,

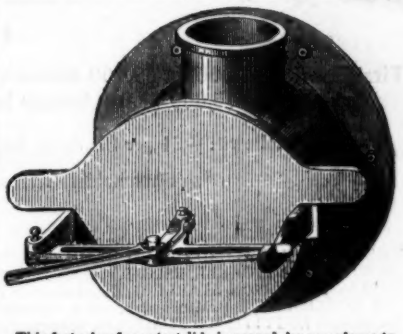
which are strongly recommended for their additional efficiency and durability, are now in use at above 150 Gas-Works.

Illustrated circular, with numerous testimonials, will be forwarded on application to the Inventor and Patentee,

A. C. FRASER,

PATENT GAS COMPANY, GAS-WORKS, BARNET, HERTS.

BOX'S PATENT FASTENING.



This fastening for retort-lids is proved by experience to be the most simple, effective, and durable of any that have ever been used.

The amount of luting is reduced more than one-half.

The lid is rapidly secured and gas saved.

For prices, references, and particulars, apply to THE SOLE MAKERS, G. WALLER AND CO., HOLLAND STREET, LONDON, S.E., and at STROUD, GLOUCESTERSHIRE.

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

VICKARYS & ROBERTSON,

Late JOHN VICKARY,

ESTABLISHED 1840,

GAS ENGINEERS, CONTRACTORS, IRON AND BRASS FOUNDERS,

WEST OF ENGLAND ENGINEERING WORKS, EXETER.

GASHOLDERS AND TANKS,

Retorts, Retort-Fittings, Condensers, Scrubbers, Purifiers, Station-Meters, Governors, Rack and Screw Valves. Gas and Water Mains always in Stock.

STEAM-ENGINES, EXHAUSTERS, SHAFTING AND GEARING, &c.

GAS-FITTINGS,

Including Chandeliers, Pendants, Hall Lamps, Brackets, Star and Sun Lights of all designs.

WET & DRY GAS-METERS,

Combining most recent improvements in principle and manufacture; upwards of 200,000 already in work, giving highest satisfaction.
(A guarantee of five years given with every Meter.)

PLUMBERS WORK, including Lift and Force Pumps; Cocks for Gas and Water and Steam; Brass Fittings.

HYDRAULIC AND GENERAL ENGINEERING.

LONDON OFFICE: 8, JOHN STREET, ADELPHI, W.C.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

THE NEW GAS COMPANY, LIMITED.

(LIGHTING AND HEATING.)

Incorporated under the Companies Acts, 1862 & 1867, by which the liability of Shareholders is limited to the amount of their Shares.

CAPITAL, £500,000.

First Issue, £250,000, in 50,000 Shares of £5 each, of which 35,000 Shares are now offered for Subscription, the remaining 15,000 Shares having been taken by the Vendor in part payment for the Patent Rights.

Payable as follows:—£1 per Share on Application; £2 on Allotment; £1 on the 1st of April; and £1 on the 1st of May, 1873.

Shareholders who may desire to do so may pay all the Instalments in one payment.

DIRECTORS.

THE RIGHT HON. LORD CLAUD HAMILTON, M.P., Chairman.
Sir WILLIAM MITCHELL, F.R.G.S., 6, Hyde Park Gate, London.
WILLIAM DALLISON STARLING, Esq., Laurence Pountney Hill, London.
WM. ECKERSLEY, Esq., Manchester, and 6, Victoria Street, Westminster.
Dr. JAMES LOUTTIT, M.D., M.R.C.S.E., Greenwich.

CONSULTING ENGINEERS.

Messrs. J. QUICK and SON, M. Inst. C.E., 29, Gt. George Street, Westminster.
ROBT. PAULSON SPICE, Esq., C.E., 21, Parliament Street, Westminster.

BANKERS—The CONSOLIDATED BANK, LIMITED, 52, Threadneedle Street, E.C., London, and Manchester.

SOLICITORS—Messrs. HARGROVE, FOWLER, and BLUNT, 3, Victoria Street, Westminster, S.W., and 44, Coleman Street, E.C., London.

BROKERS—Messrs. HUGGINS and CO., 1, Threadneedle Street, E.C., London.

AUDITORS—Messrs. QUILTER, BALL, and CO., 3, Moorgate Street, E.C., London.

SECRETARY—HENRY BROWNRIGG, Esq.

OFFICES—31 & 32, LOMBARD STREET, E.C., LONDON.

PROSPECTUS.

This Company is established for the purpose of acquiring and commercially developing the British and Foreign Patents for Improvements in the Manufacture of Gas for Lighting and Heating Purposes, known as Ruck's Patents.

The invention has not been brought before the public until after it had been thoroughly tested on an extended and practical scale with results conclusively favourable to its great commercial value.

The advantages to be derived from the manufacture of gas by this process are exceedingly important, combining—

1. A very large saving in the cost of manufacture.
2. The production of gas of greater purity and brilliancy than ordinary coal gas.
3. A saving of labour in gas-making to the extent of 50 per cent., thus reducing to a minimum the liability of strikes.
4. Simplicity of apparatus.
5. Adaptability to the lighting of houses, factories, and mansions, railway stations, &c., situated at a distance from gas-works.
6. Facility of adaptation to existing gas-works at small cost.

The new gas, although produced from hydrocarbon vapour, differs entirely from air gas, as, instead of common air, a specially prepared gas of a permanent character is employed which requires far less spirit to give it illuminating power, and possesses the further advantage of being able to travel through pipes without deposit or loss of illuminating power. It is also, unlike some air gas, unaffected by changes of temperature.

It will be of especial value where heat as well as light is required, since, before the gas receives its illuminating properties, it is a powerful heating gas, and produced at so cheap a rate that it must prove a source of extended usefulness, and of important revenue to this Company.

In addition to the above, the patents comprise a new process for the manufacture of gas for heating purposes, also of very great value.

The process applied to gas for lighting purposes has been submitted to the most rigid tests, at works specially erected and quite independently of the patentee, by several of the most eminent gas engineers and professional authorities, whose reports in detail will be found enclosed in the prospectus, and it will be seen they agree unanimously as to the value of the patents both scientifically and practically.

The following are the gentlemen referred to:

Messrs. JOSEPH QUICK and SON, M. Inst. C.E., London.
R. P. SPICE, Esq., C.E., London.
F. W. HARTLEY, Esq., Gas Engineer and Analyst, Westminster.
HENRY GORE, Esq., C.E., Consulting Gas Engineer, London.
Dr. JAMES LOUTTIT, M.D., M.R.C.S.E., Gold Medallist in Chemistry,
Who has consented to join the Board of Directors.

PATENTS SECURED.

In addition to the patents granted for the United Kingdom, the necessary steps have been taken to obtain patents for the following countries, from many of which a large business is expected:—

France	Brazil	Jamaica	Bahamas
Belgium	Argentine Republic	Trinidad	Bermuda
Prussia	Uruguay Republic	Barbadoes	Cape of Good Hope
Russia	Paraguay	Tobago	Demerara
Bavaria	United States	Turkey	Chili
Austria	Canada	Danubian Provinces	Newfoundland
Italy	India	Greece	Vancouver Island
Saxony	Ceylon	Egypt	Peru
Spain	New South Wales	Japan	Bolivia
Portugal	Victoria	St. Lucia	Venezuela
Sweden	Queensland	St. Kitt's	Columbia
Denmark	Tasmania	Antigua	Guatemala
Norway	New Zealand	Montserrat	Nicaragua.
Mexico			

The special process of manufacture of gas for lighting purposes under these patents is amply described in the reports of the above-mentioned gentlemen, by which it will be seen that a new discovery of immense importance has been arrived at.

GREAT ECONOMY IN MANUFACTURE.

By this process great economy in the cost of manufacture is effected, the cost of production of gas of 16¼-candle power delivered into the gasholder by the new process, being under 1s. 8d. per 1000 cubic feet, while the present coal gas (with coals at 26s. per ton) costs 2s. 4d. net per 1000 cubic feet, being 40 per cent. higher than by the new process.

A larger saving even than this will be effected in places at all distant from the coal centres, whilst in foreign countries, to which coal has to be transported for the manufacture of gas, a saving of from 1s. to 3s. per 1000 cubic feet will result from the adoption of Ruck's Patents.

In view of such very great economy, commercially, it is not unreasonable to expect the gradual adoption of the process by existing companies all over the world.

PURITY OF THE NEW GAS.

The reports accompanying prospectus speak highly in favour of the process as regards the production of illuminating gas of a permanent character of high power and of great purity; it makes no smoke, is not injurious to health, and from its purity will not injure plants, pictures, nor works of art of a delicate character.

GREAT SAVING OF LABOUR.

Another advantage in the manufacture of gas by this process is the great saving of labour (an important matter in the times of strikes and combinations, as shown in the recent gas stokers strike), the saving being 29 men out of every 30, that is to say that one man is sufficient to perform the same work which has hitherto required 30; the economy thus effected is self-evident.

SIMPLICITY OF APPARATUS.

With regard to the apparatus required for the process of this Company, existing gas-works can easily be adapted to the new process at a very moderate cost. The process can also be applied to single houses, mansions, factories, or other establishments at a distance from towns, where this gas can be supplied, of equal power and brilliancy to gas in towns, but manufactured on the premises from simple apparatus, easily managed, free from risk, and not liable to get out of order, and at a low cost. A very large revenue is expected to be derived from this source alone.

PROCESS HAS BEEN TESTED ON A LARGE SCALE, AND CAN BE SEEN ON APPLICATION.

With a view to enabling the most thorough tests to be applied to the process, and to give facilities for a full and complete examination of the results, the company have erected works on a practical scale at Battersea, which gas engineers and intending shareholders are invited to inspect.

A DISTINCT PROCESS FOR GAS FOR HEATING PURPOSES.

The patents of the Company include, as above stated, a process for the manufacture of gas for the generation of steam and other heating purposes, which are alone of very great value.

COST, SEVENPENCE PER THOUSAND FEET.

By such process gas can be produced at a cost of 7d. per 1000 cubic feet, available for the generation of steam for steam-vessels, and by its application the carrying capacity for cargo will be greatly increased.

HIGHLY PROFITABLE RESULTS EXPECTED.

The sources of revenue open to the Company are, therefore, of a highly remunerative character, and the directors confidently look forward to most gratifying results from the adoption of their patents.

PROCESS PROVED TO BE THOROUGHLY EFFECTIVE.

The Directors have taken special pains to satisfy themselves of the value of the new process for practical purposes on the largest scale, it being their opinion that at no distant date it will, to a great extent, supersede the present mode of manufacturing gas.

Negotiations for the acquisition of the Company's patent rights in several foreign countries are already entered upon, and, apart from the large sums thus to be obtained, a moderate royalty for the use of the invention will alone, it is confidently expected, yield very large returns to the shareholders.

The consideration to be paid to the vendor for all patents, British and foreign, and for all future improvements by the inventor, is £50,000 in cash and £75,000 in shares of the Company; also one-tenth of the surplus profits in every year, after the declaration by the Company of a dividend of 25 per cent., and one-tenth of the net proceeds of any foreign patents which may be sold for sums in gross.

In the event of no allotment being made to any applicant, the deposit paid will be returned forthwith, without deduction. Should the shares allotted be less than the number applied for, the surplus paid on application will go in reduction of the amount payable on allotment.

Scrip certificates will be issued on receipt of the amount payable on allotment until the full amount of the shares has been paid, when they will be exchanged for share certificates.

Copies of the Articles of Association of the Company and of the agreement for the purchase of the patents, may be inspected at the Offices of the Solicitors of the Company, Messrs. Hargrove, Fowler, and Blunt, 44, Coleman Street, E.C., London, and 3, Victoria Street, Westminster, S.W.

Applications, accompanied by the payment of £1 for each share applied for—which must be for not less than 20 shares—will be received on the form annexed, which can be forwarded either to the Consolidated Bank, Limited, Threadneedle Street, E.C., London; or to Henry Brownrigg, Esq., the Secretary, at the Company's Offices, 31 and 32, Lombard Street, E.C., London.

Prospectuses and Forms of Application can be obtained at the Brokers of the Company, Messrs. Huggins and Co., 1, Threadneedle Street, E.C., London, or of the Secretary, at the Offices of the Company.—By order of the Board,

CLAUD HAMILTON, Chairman.
HENRY BROWNRIGG, Secretary.

31 and 32, Lombard Street, E.C., Jan. 24, 1873.

Cards of admission, available for Gas Engineers and others interested in this great enterprise, to see the works at Battersea, can be obtained on application to the Secretary or to the Engineers of the Company.

A contract has been entered into, dated Jan. 24, 1873, between William Eckersley, of the one part, and Benjamin Smith, on behalf of the Company, of the other part.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

SCHOLL'S

PATENT PLATINUM

GASLIGHT PERFECTER.

Extract from Report by Dr. Letheby:—

"The results have been very remarkable, for they show an average increase of 63 per cent. on the illuminating power of the gas. I am of opinion, therefore, that the invention is of great practical value."

Extract from Dr. Frankland's Course of Lectures at the Royal School of Mines, February, 1868.

"Scholl's Platinum Perfecter is one of the most important inventions of modern times in connexion with the burning of coal gas."

Price 1s. each for Fishtail Burners.

To be had retail of Gas-Fitters and Ironmongers.

JOHN SCHOLL, Manufactory: 41 & 42, BERWICK STREET;

Retail Depot: 198a, OXFORD STREET, LONDON, W.

Terms on application. N.B.—A specimen sent free on receipt of Twelve stamps.

*** Further testimonials from Drs. Frankland and Crooks, showing the great practical value of this invention, will be shortly published.

CANNEL COAL.

ELLIS, LEVER, & CO.,

GAS COAL MERCHANTS,

107, PICCADILLY, MANCHESTER.

ALL CLASSES OF

ENGLISH, SCOTCH, & WELSH CANNEL COALS.

SAM. CUTLER & SONS,

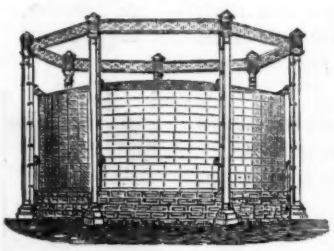
CONTRACTING GAS ENGINEERS,

GASHOLDER & GENERAL GAS APPARATUS MAKERS,

MANUFACTURERS OF

BOILERS, IRON ROOFING, IRON BRIDGES,

AND GENERAL IRONWORK.



S. C. AND SONS undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works**, for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs**, and every description of **Apparatus** for the Manufacture and Distribution of Gas.

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BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

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J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

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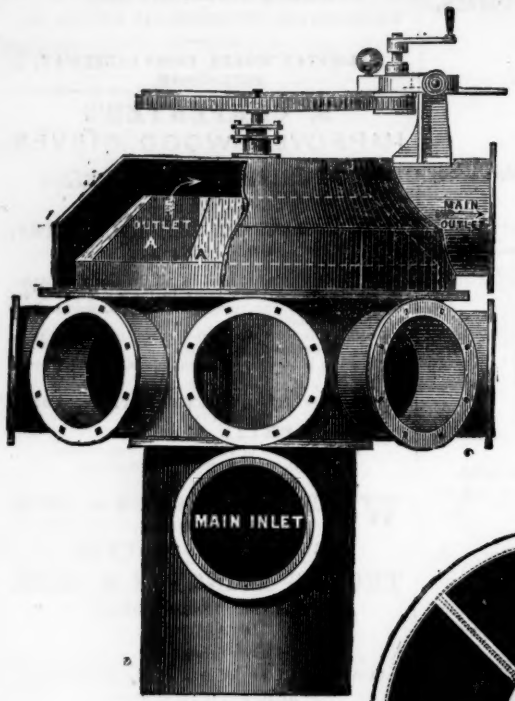
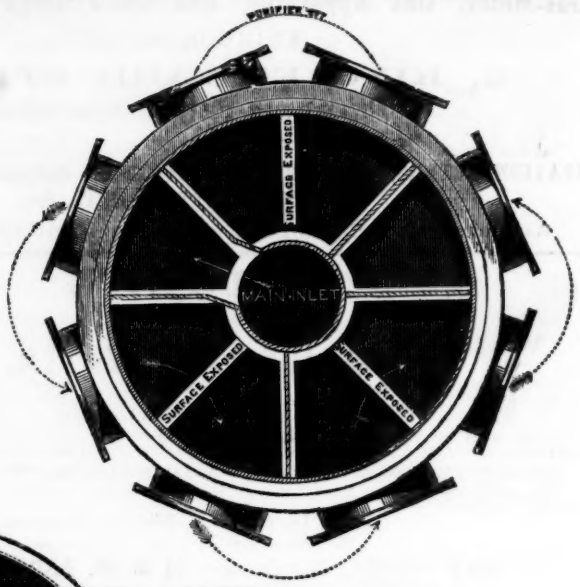
These Sieves are made with parallel or bevel bar, and guaranteed to be well seasoned yellow deal, and not common spruce so generally used.

N.B.—Specimens sent free on application.

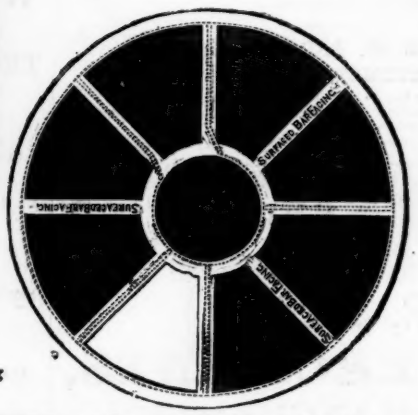
C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.



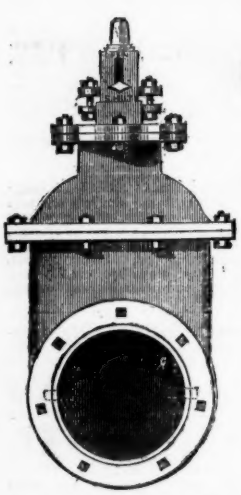
Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



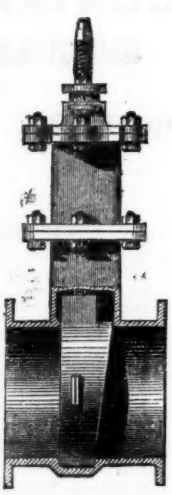
Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.



C. & W. WALKERS'
DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves are superseding the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

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WOOD SIEVES FOR PURIFIERS,

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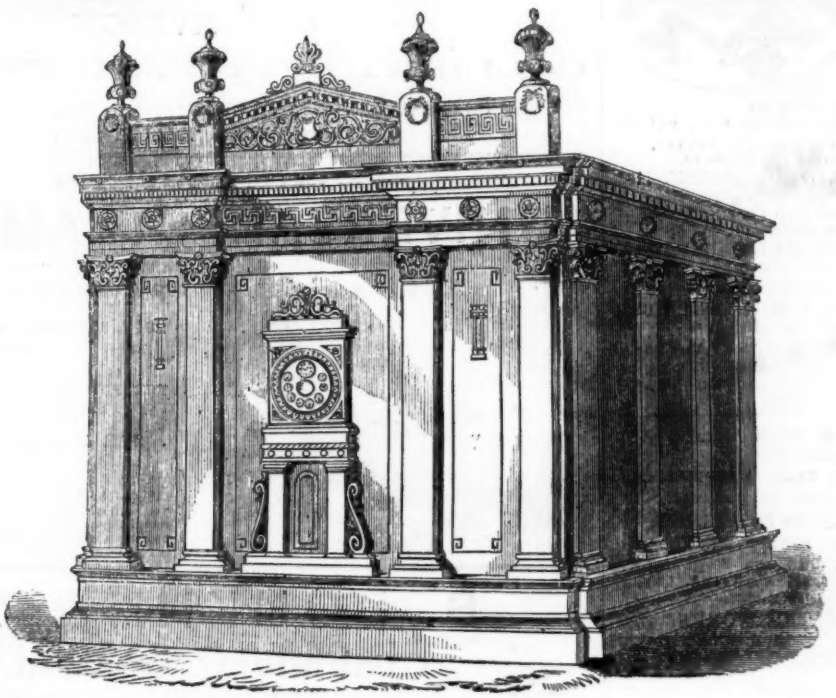

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Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

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ROBERT P. KEYS, Accountant and Auditor (Author of the "Meter Life Book"), Removed to 52, CLIFTON STREET, late 1, Worship Square, FINSBURY, E.C.

Secretaries of Gas and other Companies assisted on moderate terms in making up their Books and Balance-Sheets.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
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Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

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CARBONACEOUS INCRUSTATION FROM GAS-RETORTS.

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"THOMAS STONE, Manager.

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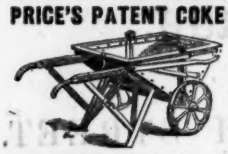

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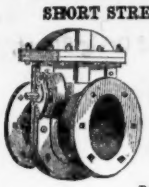

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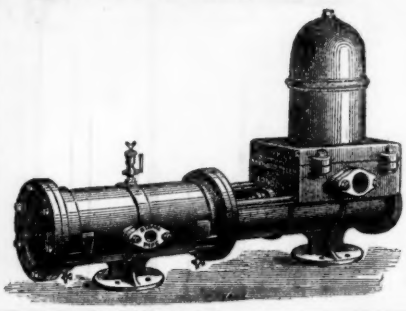

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(Signed) PETER HART, *Manager.*

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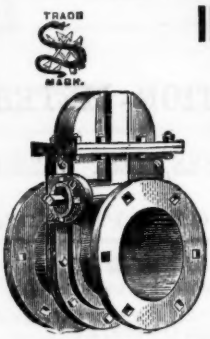

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These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.
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These Regulators are in general and increasing use, and references can be given to Gas Companies who for many years have used them for every Lamp.

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STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

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"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

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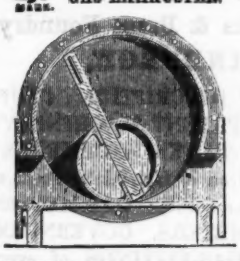

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B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise.

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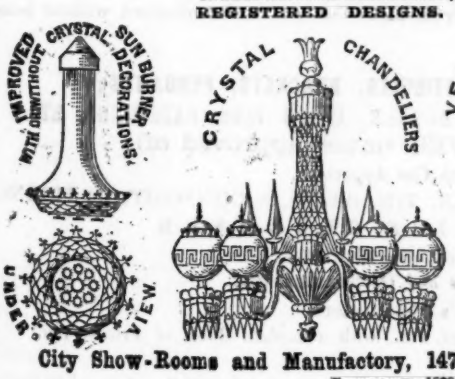

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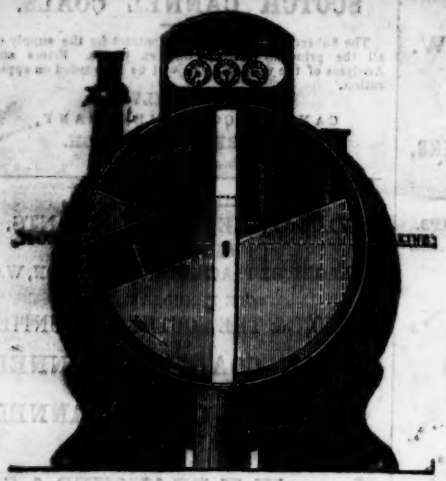

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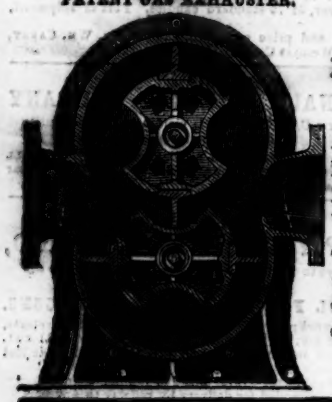

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